A CHILTON PUBLICATION

the Iron Age

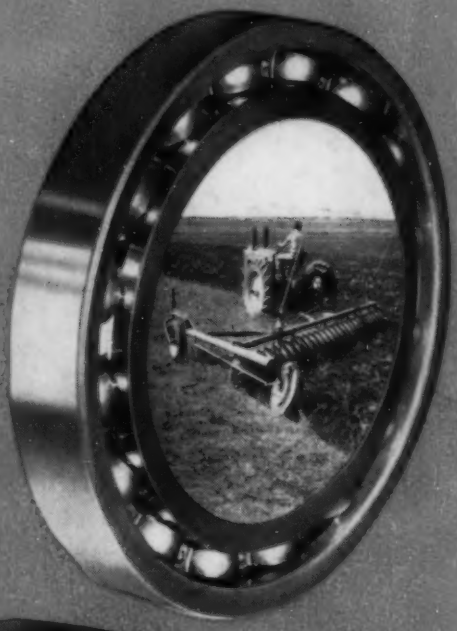
NATIONAL METALWORKING WEEKLY

April 17, 1952

NTS PAGE 2

No conversion problem . . .

in these dual-purpose plants



Jig borers and jets, trucks and tanks, household appliances and electronic instruments, all use New Departure ball bearings of the same materials, same heat treatment, the same methods of precision manufacture.

Thus conversion from one to the other in New Departure's three great plants is largely a matter of changing the emphasis on types and sizes.

The capacity of the world's largest ball bearing plants is your assurance of the best possible production schedules.

Nothing Rolls Like a Ball...

North Side Bristol group are "guns-and-butter" plants.

NEW DEPARTURE

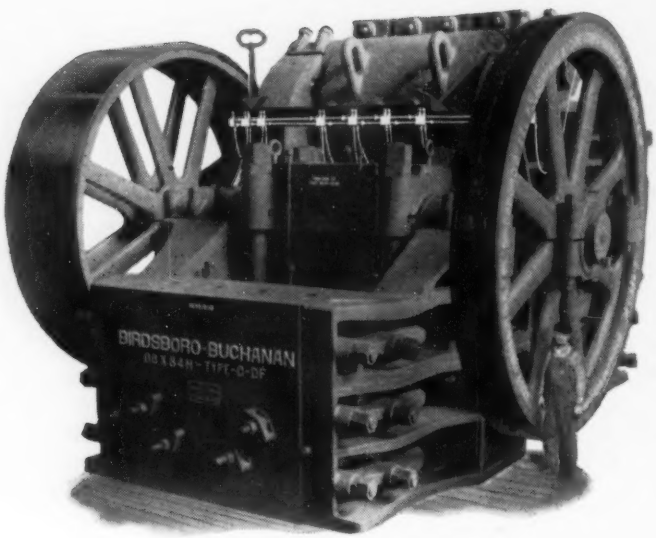
BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT

164FC

World's largest deep frame jaw crusher is protected by Farval lubrication

FARVAL—*Studies in Centralized Lubrication* No. 133



KEYS TO ADEQUATE LUBRICATION—*Wherever you see the sign of Farval—the familiar valve manifolds and dual lubricant lines—you know equipment is properly lubricated. Thus you can see there will be no bearing trouble on this Birdsboro-Buchanan crusher.*

This giant weighs 275 tons, stands 18 feet high, has a 66- x 84-inch jaw opening. It handles feed from a 5-cu.-yd. shovel, discharging a 14-inch product at the rate of 800 t.p.h. It is one of more than fifty thousand industrial machines whose bearings are protected by Farval.

Photo above by courtesy Birdsboro Steel Foundry & Machine Co.

IN the next few months, this mammoth machine will crush three million tons of diorite. Largest deep frame jaw crusher ever built, it is operating on the Detroit dam project in western Oregon.

A highly publicized feature of this project is the cooling of all the aggregates used in the concrete construction. The builder of this crusher insured that the bearings in his equipment would always run cool, too. He equipped it with a Farval Centralized Lubrication System.

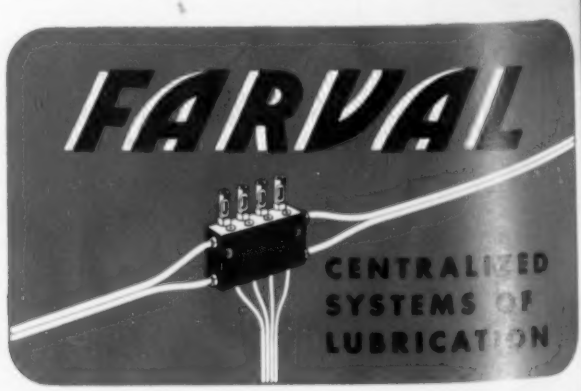
With Farval on the job, no special oilers are needed, lubricant consumption is reduced, bearing life is extended indefinitely and shutdowns for oiling or bearing replacement are eliminated. In short, Farval insures that the crusher can work day in, day out, without interruption from overheated bearings, in doing its part to see that the great Detroit dam is finished according to schedule.

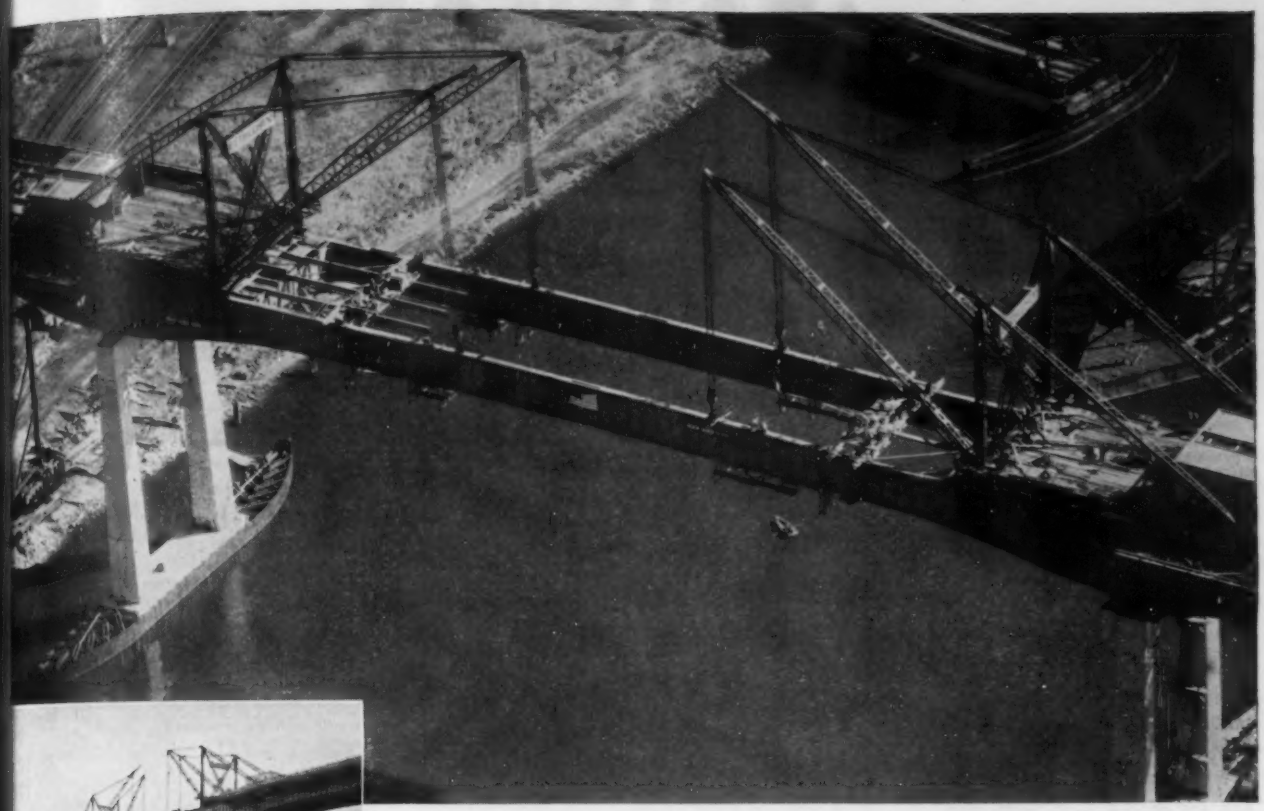
Farval is the original Dualine system of centralized lubrication for industrial equipment, proved practical in 25 years of service. The Farval valve has only two moving parts—is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its full hydraulic operation, the Farval system unfailingly delivers oil or grease to each bearing—as much as you want, exactly measured—as often as desired. Indicators at all bearings show that each valve has functioned.

In or near your city there's a Farval engineer, ready to discuss your lubrication problems and suggest a proper system to meet your particular needs.

The Farval Corporation, 3252 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.





Aerial view of six-lane Passaic River Bridge, showing Bethlehem Steel crew fitting closing girders into place. *Owner:* New Jersey Turnpike Authority; *Chief Engineer:* Charles M. Noble; *Former Executive Director:* W. W. Wanamaker; *Consulting Engineers:* Ammann & Whitney, New York; *General Consulting Engineers:* Howard, Needles, Tammen & Bergendoff, New York.

Travelers on bridge deck, each equipped with two booms, shown raising twin 115-ft closing girders, having a combined weight of 292 tons.

New Jersey Turnpike Crosses Passaic River

One of four haunch girders, erected over main piers at night because of tide conditions. Girder is 130 ft long, 22 ft deep, weighs 173 tons.

Shown under construction, the giant Passaic River Bridge is an important link in the New Jersey Turnpike, the 118-mile limited-access high-speed highway traversing the state. The bridge crosses the river and twenty railroad tracks, and passes beneath the Pulaski Skyway. Over the river it has an under clearance of 110 ft from mean high water. Its approaches extend from a point south of Raymond Boulevard, in Newark, to approximately 800 ft beyond the Newark Turnpike, in Kearny.

The south approach superstructure for the Passaic River Bridge consists of nineteen simply-supported deck-girder spans for an overall length of 2,526 ft. The north approach superstructure has twenty-four similar spans, covering a distance of 3,055 ft.

The 1,365-ft main river portion of the bridge, also of the deck-girder type, consists of five spans. Here the three interior spans are continuous over four supports, with the two extremities cantilevered to carry the two end simply-supported suspended spans.

The Passaic River Bridge has two reinforced concrete roadways, each 36 ft wide, plus a central mall and safety walks. Its 7,000-ft length and 22,000-ton superstructure make it the largest of 24 Turnpike bridges for which Bethlehem fabricated and erected the steelwork.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

FABRICATED STEEL CONSTRUCTION

IRON AGE

APRIL 17, 1952
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NBP — National Business Publications

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DIGEST

of the week in metalworking

PAGE 65 **HAS TRUMAN THE RIGHT TO SEIZE STEEL?** If the steel wage dispute is not settled quickly, it will result in a slam-bang court battle on the legality of President Truman's high-handed seizure of the steel industry. The industry will seek satisfaction all the way up to the Supreme Court if it has to. Steel's injunction try was snubbed.

PAGE 66 **GOVT. "SUASION" TIGHTENS STEEL SCREWS** Steel price-wage bargaining bogged down in Washington. Government has threatened to deal with labor if agreement isn't reached this week. New contract may be for 2 years, with most WSB recommendations—except the union shop. Prices are expected to go up $5 to $6 a ton on the average.

PAGE 67 **PLASTIC TENITE PIPE FINDS NEW USES** Important in the growing field of plastic pipe is Tenite which is finding new uses among process industries. Tenite piping has been used with salt water, crude oil, sour crude oil, natural gas, etc. A high corrosion resistance has been shown. Australia with corrosive water has taken to Tenite.

PAGE 68 **INDUSTRY BARES SOCIAL SOUL ON PENSIONS** Industry interest in pensions to insure superannuated employees cash security in retirement is a swelling movement. Industry realizes the need and is not ignoring it. Vast strides can be expected in the next two decades as the population ages. Some say the field should be left to the U. S.

PAGE 70 **CANADA MEASURES FUTURE IN MINERALS** Canada is a growing young giant of minerals. Although it's one of the foremost producers already, there is much more to come. The stage is set for fast, huge development—and it will benefit both the U. S. and Canada. In its next issue, The Iron Age starts a weekly Canadian column.

PAGE 90 **DETROIT STARTS PUSH FOR HIGHER SALES** Automakers are turning their attention to getting more sales volume. Stocks are still low from earlier cuts and even a slight sales spurt could deplete inventories for a while, but carmakers are worrying about the long-term record. Sales in the first quarter of 1952 have stayed depressingly low.

PAGE 97 **BACKLOGS TO DETERMINE TOOL DELIVERY** A master urgency list and a new machine tool distribution plan were about ready for issuance early this week. These are expected to simplify the scheduling and shipping of tools according to the greatest need as indicated by military production schedules. The plan's a modified E 1b version.

PAGE 107 **DETAILED REPORT ON MACHINING TITANIUM** Detailed report based on Navy-Westinghouse research tells how to machine titanium; tool design, speeds, feeds, and coolants. Covers turning, broaching, drilling, tapping, reaming, and milling. Includes first published data on production use of liquid carbon dioxide as coolant.

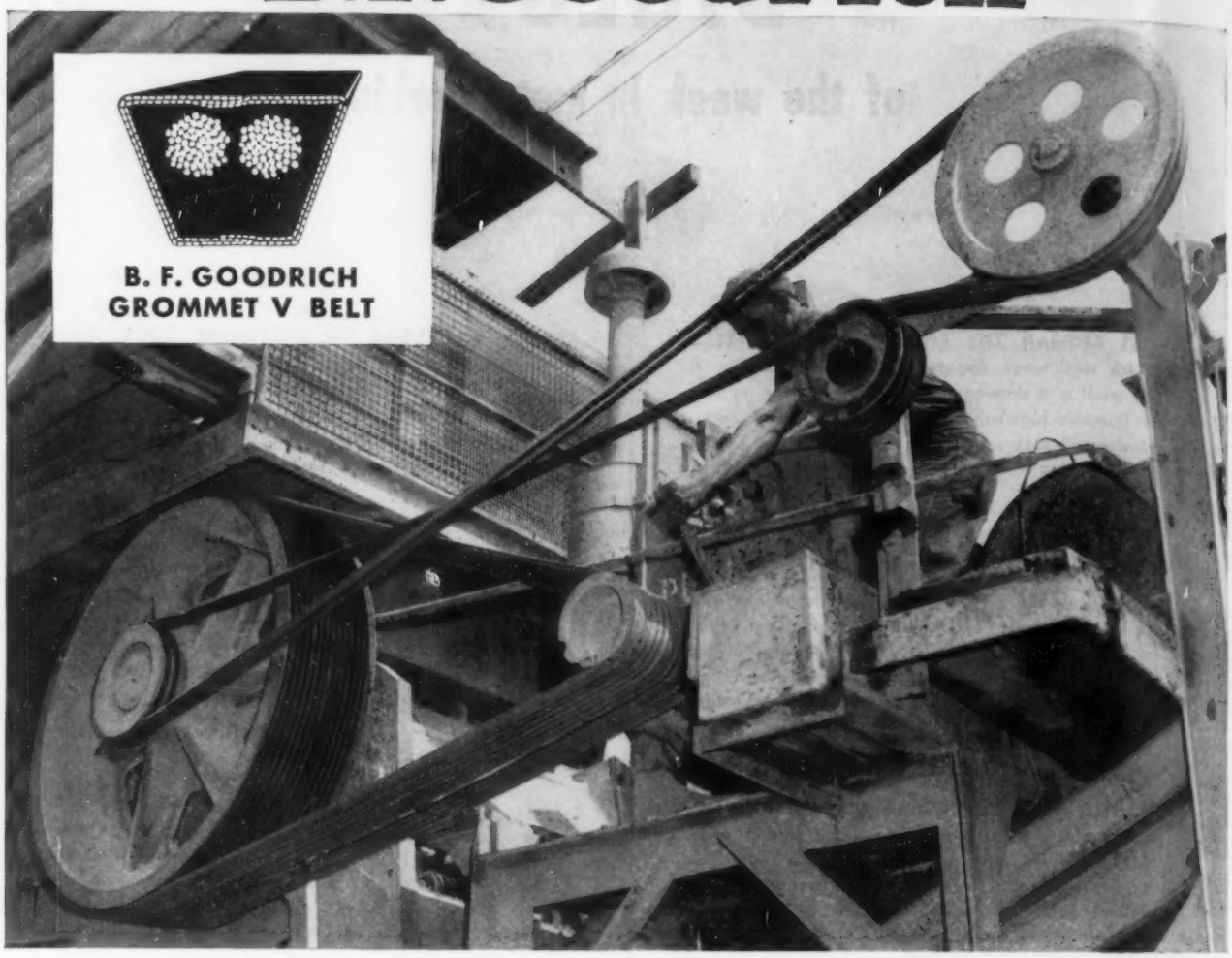
PAGE 111 **CONTINUOUS RECARB - ANNEAL FURNACE** A new 6-zone continuous carbon restoring-annealing furnace has increased production over batch methods as much as 240 pct per invested dollar. Greater uniformity of surface carbon is obtained and "scalloped" bars have been eliminated. Takes bars up to 6-in. diam, coils up to 54 in.

PAGE 116 **MOLD COST CUT WITH SEA SAND, CEMENT** Molds made of sea sand and cement instead of clay get rid of smoke and carbon monoxide hazards in a Danish foundry. Saving in molding time, coke, and consumption of gaggers, rods, and nails, is enough to cover higher costs of cement sand. Parting problems occur but they can be solved.

PAGE 149 **STEEL PRODUCTION HITS COMEBACK TRAIL** Steel production started its slow climb back to normal last week. Most mills reached normal output early this week. Delivery will be pushed back 2 weeks to a month depending on type of product. Most consumers have enough inventory to weather the shock. Electric output hurt the least.

NEXT WEEK **RARE EARTHS IMPROVE FERROUS PROPERTIES** A ladle addition containing more lanthanum than regular misch metal is used in stainless, electrical steel, and tool steel grades. Not all of the benefits from rare earth additions can be attributed to their desulfurization action. Effect on nitrogen content may be more important.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Three years at hard labor for B. F. Goodrich grommet belts

B. F. Goodrich grommet V belts cut costs 20 to 50%

POUNDING action of this machine put terrific shock and strain on the V belts. Belts are outdoors, have to stand rain, dust and dampness. When belts wore out, work stopped—costs went up by the minute.

Then a B. F. Goodrich man suggested using B. F. Goodrich grommet V belts. When the picture above was taken, the grommet belts had been in use 3 years, and looked good for a lot more service. BFG grommet belts look the same as ordinary belts but, because they are made in an entirely different way, grommet belts stand more shocks and heavier loads than any other kind. Here's why:

No cord ends—A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength—All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip— Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!— No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B. F. Goodrich distributor. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Grommet V Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

The Iron Age
FOUNDED 1855

Truman's Tantrum

MR. TRUMAN's unfair attack on the steel industry last week was full of bad temper, extreme prejudice, and inaccuracies. It has ruined a serious and successful attempt by the steel industry to build better relations with the public and with its employees.

More serious than any of these things: Mr. Truman's actions were the tactics of a dictator. No authority existed for Mr. Truman to take such high-handed action as seizure of the steel industry.

The long bitter speech was an attempt to rationalize a rash and unprecedented step. Stalling of government lawyers as steel seeks redress in court indicates the shaky ground Mr. Truman is on.

We must look silly to foreign dictators whom we have been lambasting for sabotage of freedom. Mr. Truman's irresponsible action is a sad commentary on sacrifices by those who died for freedom.

Those who wrote Mr. Truman's speech knew what they were having him say. They knew the figures on steel profits were propaganda. They knew the speech gave complete approval to WSB recommendations which made a mockery of the word "stabilization." They knew, too, that the threat of "take it or we will force it on you" was indicated.

Mr. Truman knew all this, too—or he should have known it. He had been fully informed about the steel case since last November. His assistant, Dr. Steelman, has known since late last year that the steel case was heading for the rocks. Mr. Wilson told Mr. Truman last January how serious things were.

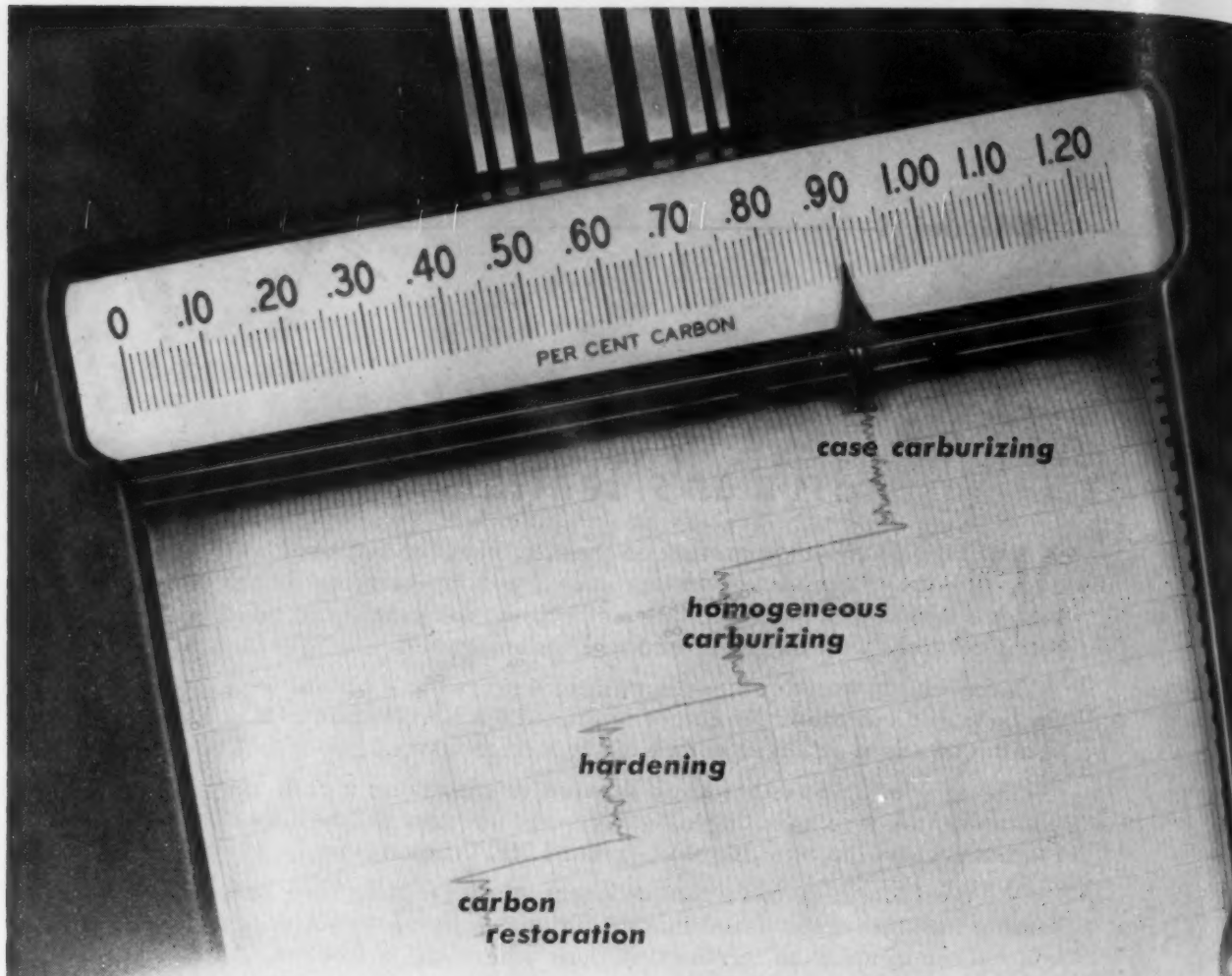
Mr. Truman knew steel companies would have to have some price relief if they were to meet the WSB recommendations. He knew, too, how serious was the demand for the union shop but he ducked it.

Knowing all this Mr. Truman delivered an unwarranted, one-sided diatribe. He has damaged the reputation of steel people, perhaps beyond repair. He has set in motion the sixth wage round. He has resorted to dictator methods on behalf of the union.

If the courts uphold this action no business or industry is secure.

Tom Campbell

Editor



This heat-treating record ...is NEWS

The above chart shows a record of surface carbon control during four types of heat-treating processes. During three of these operations carbon is added; during the fourth, it is accurately maintained.

This record, provided by the familiar Micromax Recorder modified for this purpose, is an exclusive feature of the Microcarb method of carbon control as applied to the Homocarb furnace. There is no other way of getting even one of these records, much less all four.

Ninety-nine out of a hundred metallurgists and heat-treaters will find this record is new... something they have never seen before. It tells them exactly what's going on...gives the heat-treater time enough to modify the process or take whatever other action is desirable. It's the NEW way to reduce rejects.

The significance of this new development will, of course, depend upon the plant setup, and must be assessed individually by the metallurgist or heat-treater concerned. However, initial users of Homocarb with Microcarb control are enthusiastic.

One such firm found the results so important to their customers that they featured the story in their own advertising. As more and more manufacturers become familiar with the advantages of Homocarb plus Microcarb, this equipment will soon be more generally known to men who look for the modern way to carburize.

Let us send you further facts about this new development. We may be contacted at our nearest office, or 4956 Stenton Ave., Phila. 44, Penna.

LEEDS & NORTHRUP CO.

INSTRUMENTS • AUTOMATIC CONTROLS • FURNACES

Jr. Ad TD4-623(7)

Dear Editor:

Letters from readers

The Control Complex

Sir:

In reading your Feb. 28 issue, the editorial on "The Control Complex" struck us as being an excellent piece of work. It is certainly a timely subject; you have undoubtedly heard some interesting comments on it.

Our internal publication entitled "The Works" is sent out to our employees and dealer - distributers throughout the United States and foreign countries, a total of about 2500 copies. We would like very much to include your editorial in one of our future issues, with your permission of course.

T. O. EGGEN
Pioneer Engineering Works, Inc.
Minneapolis

Spark Testing

Sir:

You should know that THE IRON AGE has published more articles on spark testing than any other periodical.

Because this company has always used the test extensively, we made up a list of references on the subject several years ago—copy attached.

There is a book on the subject, illustrated with 48 colored plates of spark streams and 92 black and white plates, plus a number of drawings. It was written by a Professor Shigeo Oketani of the Tokyo Institute of Technology after some study here 15 or 20 years ago.

We are enclosing photostats of the Gordon and Reid and Lundahl articles if you wish to send them to Mr. Huang.

F. M. WEITLAUF
Technical Librarian
Timken Roller Bearing Co.
Canton, Ohio

Thanks for helping our reader, P. C. Huang of Taiwan, China. We are forwarding all the material you sent us to him.—Ed.

Machining Carbides

Sir:

We were very much interested in your article in the Mar. 20 issue concerning the various methods of machining carbides. Can you advise us which companies are promoting the methods suitable for the shaping and finishing of drawing dies, particularly by the ultrasonic process?

J. A. KEARNEY
Chief Metallurgist
Crucible Steel Co. of America
Spaulding Works
Harrison, N. J.

Ultrasonic grinding and machining is being developed by Cavitron Equipment Co., New York. Electrolytic machining is being developed by the Army at Frankford Arsenal, Philadelphia and by Super-Cut, Inc., Chicago. Electro-sparking equipment is being developed by Method X Co., Pittsburgh and by Elox Corp., Clawson, Mich. There are other small firms making similar equipment in either the electro-arcing or electro-sparking class.—Ed.

Metal Removal

Sir:

On p. 104 of your Mar. 27 issue appears a picture demonstrating a new tool grinding method using standard abrasive wheel instead of diamond wheel for carbide tools.

We are unable to find the address of the Metalloid Corp. which manufactures the special machine and fluid. Will you please furnish us with their address.

P. A. LAMPHEAR
Wolverine Brass Works
Grand Rapids

The address of the Metalloid Corp. is Huntington, Ind.—Ed.

For The Record

Sir:

On p. 57 of your Mar. 20 issue a prominent article appears outlining a new mill to be installed by Atlas Steels, Ltd. at Welland, Ont., and states that the slabs will enter the mill through a high head furnace.

Please note that our company is building this particular furnace and that the "Hi-Head" designation for this type of furnace is a trademark for which we have applied. We would, of course, prefer to have you designate this furnace as an R-S Hi-Head furnace.

S. M. STOLER
Sales Manager
R-S Products Corp.
Philadelphia

Ultrasonics

Sir:

We are very much interested in the article "Ultrasonics Make Soldering Easier" appearing in your Mar. 27 issue.

Is it possible for you to advise whom I should contact with reference to further information on this particular method of soldering.

E. R. BOND
Secretary-Treasurer
Textile Specialty Co.
Greensboro, N. C.

Write the International Electronic Corp., 137 Hudson Place, New York, N. Y., for further information.—Ed.

"I NEVER KNEW OUR PARTS COULD BE MADE THAT WAY—AND SO MUCH BETTER, TOO!"
Yes, Pheoll COLD-HEADING AND ROLL THREADING PROCESSES MAKE BETTER PARTS . . .
Stronger, Faster, Cheaper

Countless small parts usually made by conventional turning processes — by stamping, drawing, casting or molding— can be made *better . . . stronger . . . cheaper* by *cold-heading* and roll threading.

Machining of Cold-Headed Parts is hardly ever necessary because shank and head dimensions can be held to very close tolerances. Rolled threads are produced to American Standard dimensions.

Here are just a few of the many parts formed or roll threaded . . .

Screws	Plastic Inserts	Stems
Bolts	Thumb Screws	Arms
Studs	Wing Nuts	Plugs
Rivets	Small Gears	Prongs
Rods	Tongue—Clevis	Points
Links	Segments	Hooks

Single or multiple secondary operations can be performed on cold-headed parts to produce special characteristics required to fit the part for its particular application. These secondary operations include drilling, tapping, milling, shaving, flattening, notching, flanging, trimming, serrating, bending, off-setting, slotting, fluting, swaging, knurling, pointing, heat treating, plating and finishing.

ARE YOU MISSING THIS SAVING?

Write or call in a Pheoll engineer. Explain your production problems. He will tell you where you can save money, speed production, improve your product appearance.

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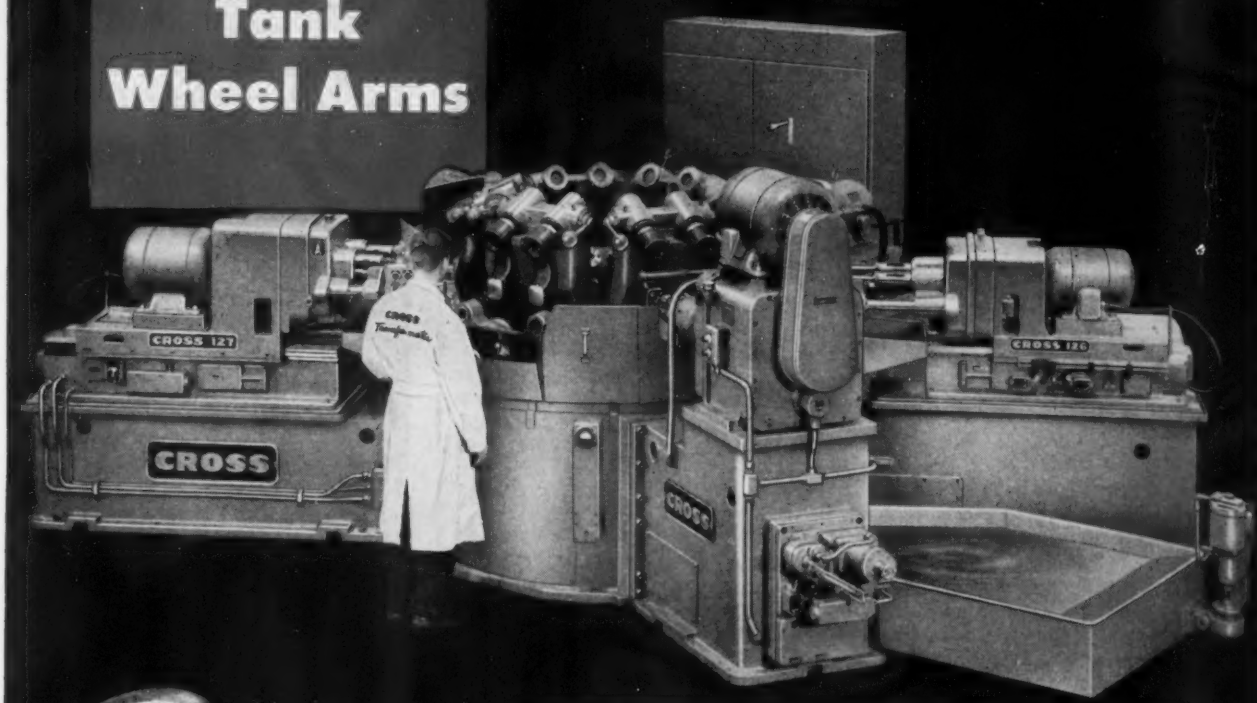
Another Special by Cross



- ★ Drills, chamfers and taps four holes; drills chamfers and reams one hole in Tank Intermediate and Rear Wheel Arms.
- ★ Material—Cast Armor. Hardness—Rock. C35
- ★ 64 pieces (32 right and 32 left hand) per hour at 100% efficiency.
- ★ Duplex work holding fixture holds one right hand and one left hand part in each station.
- ★ Six-station power operated index table, including one for loading, two for drilling, one for chamfering, one for reaming and one for tapping.
- ★ Other features: Fluid motor index drive, J.I.C. standard construction with stranded wire, hardened and ground ways, hydraulic feed and rapid traverse, individual lead screw feed for tapping, Sav-A-Tap spindle construction.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Fatigue Cracks

by Charles T. Post

Scrambled

All of your f.f.j.'s news staff scrambled the weekend before the steel industry labor crisis came to a head, but it's safe to say that none scrambled so much as top editor, Tom Campbell, himself. Tom moves in personally on news coverage of any labor crisis. As Pittsburgh editor, he was on the inside of labor news from the early days of the New Deal until he moved into the forward editorial echelons in New York. On the 1946 strike he scooped the daily papers on the settlement by three days. His experience and contacts are invaluable when the labor wars get hot.

Tom dogged the paths of the key industry, labor, and government conferees through the day and far into the night during the current crisis. When he got home, he worked out on the telephone lines. His April 'phone bill will assure a profitable month for the Bell system. He didn't even stop scrambling on Sunday. That was the day of his church's annual breakfast, and Tom has held the official post of chief egg scrambler for four years. That day he scrambled 360 eggs. After that, he went to church. And, after church, he got on the long distance 'phone again to ferret out the prospects for labor peace.

Pittsburgh Plus

Ask any Pittsburgher, and he'll tell you that the city is really going places. New Yorkers claim a sophistication that doesn't permit them to get overly excited about anything new, big or unusual. But we've just discovered the tables turned.

Lever House, new New York home of Lever Brothers, the soap people, has a new window-washing platform that made headlines in all the New York papers. Tracks run around the edge of the glass-walled skyscraper's roof. These provide a movable cable anchorage from which a platform is lowered down the side of the building to carry two window washers. (The windows are sealed, and can't be opened from the inside.)

Now we appreciate Lever's feeling for cleanliness, but the thing came as no surprise to anyone who has sat in your f.f.j.'s Pittsburgh office. For, across the street on the Mellon Bank Building, there is also a track around the roof and a car which is lowered to carry a window washer. Only one washer, though, as we recall, not two. New York naturally wants to do things in a bigger way.

Nickel Beer

With a pencilled comment, "What happened to the nickel beer?", Bill Sherman of the Automobile Manufacturers Association sends us the bulletin of the Indianapolis A.S.T.E. chapter heralding a "free bean supper" for members at Liederkranz Hall. Sounds like the good old days, and all tool engineers not already full of beans no doubt were on deck.

Aptronyms

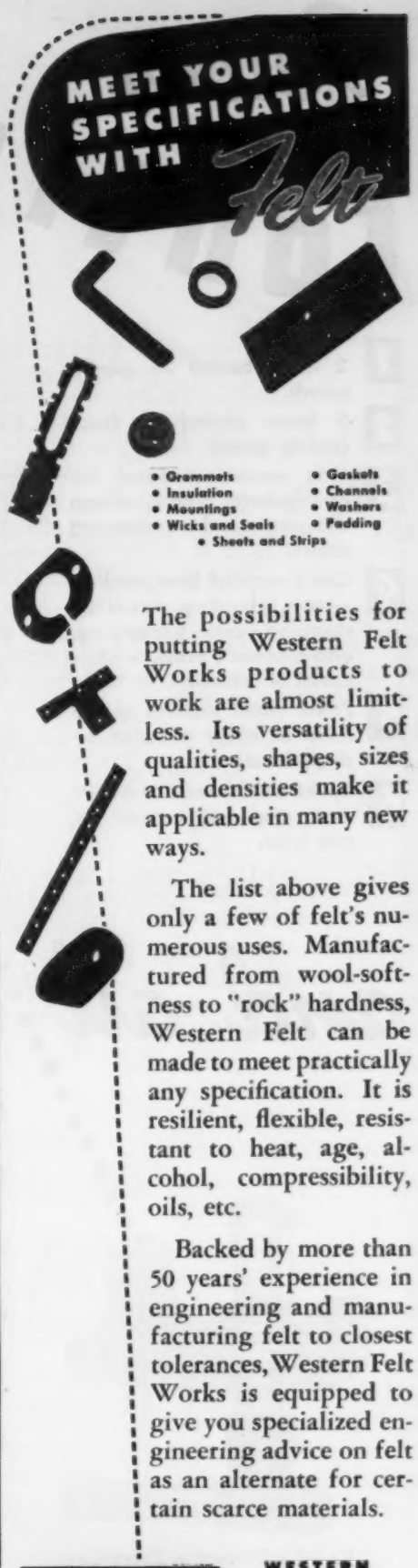
John B. Tuttle of Esso Standard Oil Co., who recalls an encounter with a New York physician named Dr. Ralph W. Gause, has just discovered that the American Mutual Liability Co. has its Manchester, N. H., offices in LaFlamme Bldg. Probably thinking of going into the fire insurance business, too.

Puzzlers

The longest beam that could be taken from the room in last week's puzzler was 14.268886 ft.

First in with the answer to the cone puzzler is R. W. Huff, Canton, Ohio. J. H. Householder, Dresser Mfg. Div., got the right answer to the chain problem but his drawing of the dog was something to behold!

M. E. McKinney, International Harvester Co., sends this one along. A peace-loving farmer had four very jealous sons. Wishing no dispute among them after his death, the farmer willed his land to his four sons in the following terms: His land was to be subdivided so that each son would have a piece of exactly the same area and the same shape. At the making of the will this was very simple since the farmer's land was an exact square. However, after he died some debts turned up and one-fourth of the square had to be sold to pay these debts. This piece of land was also exactly square. The problem therefore was to subdivide the remaining three-quarters into four plots of exactly the same area and the same shape.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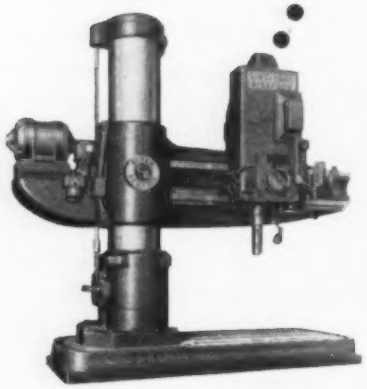

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the Iron Age
FOUNDED 1855

THE IRON AGE Newsfront

► Engineers at the AEC's Argonne National Laboratory have developed a pilot model of a crane which automatically stops hook swing in a matter of seconds. A sensing mechanism built into the controls automatically moves the crane carriage in the opposite direction to the swing. This confines the swing to a small arc and damps it out with a few reversals of the carriage.

► Air Force suppliers working under contracts signed prior to last September should ask for modification of the quality control specification, Q5923, in their contracts. The revision in that specification, Q5923A, is a lot simpler. It is better thought out and easier to work to.

► With the difficulty of getting steel plate scrap, two General Motors foundries have switched to clean scrap bundles. Results look encouraging and it may mean they will not re-enter the market even when plate scrap eases.

► Army Engineers still regard low alloy steel as the most important, dependable and available material for fixed and floating bridges although they are constantly testing wood, aluminum and plastics as possible alternates. None of the latter have been classified as acceptable substitutes yet.

► A few of the smaller steel producers with gaping holes in their third quarter order books stood to gain by a steel strike. Which explains the union's drive to sign up smaller mills.

► Lightweight field telephone wire now being made for the Signal Corps uses no rubber, less copper than World War II wire. The Army figures the saving at 15 tons of copper and 400 tons of rubber per month. At current production schedules there is also a saving of 3500 tons of steel a year because some of the new wire is packed in a new canvas container.

► Late last week three large steel companies (a fourth may join) drew up plans for a new type of public relations job similar to that done by the Atlantic & Pacific Tea Co. to counter monopoly charges against the grocery chain. One object: To offset misstatements and omissions in the Truman fireside chat.

► On a make-shift, pilot plant basis, a major foundry now going into shell molding is successfully turning out ductile iron castings weighing over 100 lb each. An experimental turntable is capable of making 150 shells (75 complete molds) per 8-hr shift. Eventually, this one unit is expected to yield 45 tons of castings per day.

► Talk about decontrols has some steel men on loan to Washington worried that steel companies may stop sending good men to Washington. They feel that attitude would hurt the industry, point out that orderly, selective decontrol will be a tough job.

► With a helping hand from the U. S., and with typical Teutonic energy, all but one of the machine tool builders who were in business in Germany before the war are back in business in Western Germany. And more companies have been added to the original number.

► Dealers in used machinery are working on a set of recommendations to be used when, or if, the government again stockpiles machine tools. Idea is to make sure that warehouses are not filled with worthless equipment as they were after World War II.

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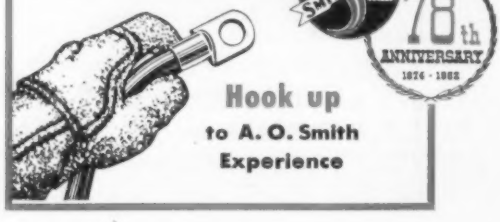

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Steel Wage Fight May Become Law Fight

President's right to seize industries could be main question . . . Steel loses first round in court battle . . . Contract settlement by government is big fear — *By J. B. Delaney.*

The tail may eventually wag the dog in the steel wage-price dispute.

Should the controversy drag on for any length of time without a settlement there is a possibility that a byproduct of the dispute will become the most important result of it.

This byproduct concerns the question of whether a President of the United States has the "inherent" authority to seize an industry —as President Truman has done— to prevent a strike he feels would harm the national interest.

The danger is setting a precedent for unjustified seizure.

Some legal authorities believe there is a chance the steel industry's challenge of this action could be carried to the Supreme Court. It all depends, they believe, on whether the industry and the United Steelworkers of America, CIO, come to an agreement promptly or whether the dispute is prolonged. A quick settlement might halt the legal action.

Lost Battle—The steel companies last week tried first for a restraining order against the President's action. Denied this, they appealed for an injunction. However, the court decided the government should have 20 days to answer the injunction proceedings so the industry's battle for prompt action was lost.

Attorneys—even Presidents— have differed, and still do, concerning the authority exercised by Mr. Truman. But even some of those who agree with the action feel this power should never be used without specific authority from Congress in each case of emergency.

President Theodore Roosevelt thought the President has the right to do anything in the national interest unless forbidden by the Constitution or by statute. President William Howard Taft held an opposite viewpoint.

In seizing the industry, Mr. Truman cited no law, probably because he realized no existing statute would be applicable in the steel crisis.

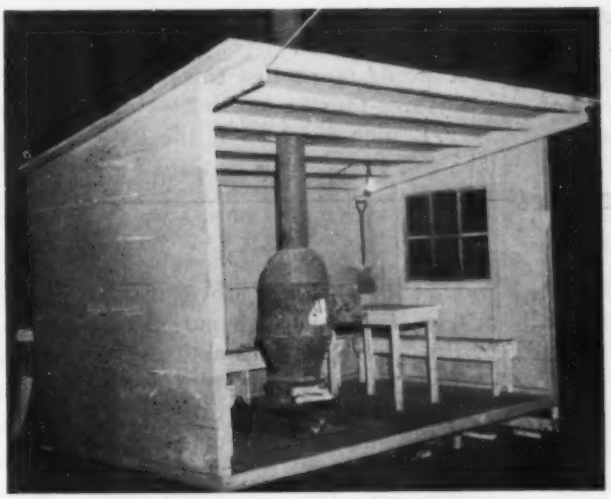
First Time — This is the first time the steel industry has been seized. President Truman directed Secretary of Commerce Charles Sawyer to take over close to 90 companies. He later excluded some firms that had settled with the union, and some plants not involved in the dispute. In the latter category were operations of Armco Steel Corp. at Middletown, Hamilton, and Zanesville, Ohio, and Butler, Pa., not under contract with USW. The Armco plant at Ashland, Ky., is involved.

Secretary Sawyer told the captured steel plants they can stick to "customary accounting procedures" with one proviso. Management must be able to show transactions since the seizure as separate.

Jones & Laughlin Steel Corp. refused for 1 day to recognize the seizure, then capitulated. But Admiral Ben Moreell, chairman and chief executive officer, agreed to serve as government manager of J. & L. plants only as an individual, contending he was not otherwise authorized by the company's board of directors.

Greatest Worry—What the steel producers fear most is that in the absence of a voluntary agreement between the industry and the union Secretary Sawyer might decide to negotiate a contract as he could do under the authority given him by the President. Each day without a settlement increases the chances of this being done. Meanwhile the steelworkers are receiving the same pay rates as existed under the expired contracts.

The industry is thinking of what happened in 1946 when, with the coal mines seized, Secretary of Interior Krug negoti-



UNUSED: Symbolic of a steel strike called off before it began was this vacant picket shelter at Clairton Works of U. S. Steel Co. Company had built the shelter for the comfort of pickets.

STEEL: Industry's a Shotgun Groom

Management told to settle "or else" . . . Won't give union shop, Sunday pay . . . WSB boss asks 2-year contract, cents-per-hr. package with fringes . . . See prices up—*By Tom Campbell.*

Steel people attending wage negotiations in Washington have been told to reach an agreement this week "or else." Washington officials denied this threat was made but it *was* made.

Negotiations reached nowhere last week. Steel firms are balking on the Sunday (as such) payments and the union shop. Reports that some firms will give on the union shops are poppycock.

The "2 year plan" of WSB's head, Nathan P. Feinsinger, has been offered to both sides. His plan will get the "pressure" this week. It looked at midweek as if the steel firms have lost everything in their fight to hold back inflation. They may win their stand on the union shop; but they will lose on the fringe and on the "cents-per-hour" raise.

Single Package—This is the way it stacks up. Mr. Feinsinger has proposed that the 12½¢ an hr and the two 2½¢ an hr "delayed" raises—one to take effect July 1 of this year and the other Jan. 1, 1953—be refigured on a 2-year basis and incorporated into a single cents-per-hour package.

It would work like this: 12½¢ plus three-fourths of the 2½¢ due July 1, plus one-half of the 2½¢ due Jan. 1, 1953. This would add up to 15.63¢ per hr.

To this may be added the 3½¢ fringe calling for the double time for Sunday. That may be incorporated into a cents-per-hour figure instead of a Sunday pay item: it comes due Jan. 1, 1953, thus one-half of 3½¢ gives 1.75¢ an hr.

When this is added to the other "reconstructed" cents-per-hour WSB recommendations it equals 17.4¢ per hr. To this must be added the 5.1¢ an hr fringe which includes holidays, vacations and shift differentials. This would give a total WSB figure of 22½¢ for a 2-year contract: equal to the WSB package on an 18-month contract.

At Gunpoint—To call the meetings of Dr. Steelman and the steel representatives a collective bargaining session would be stretching the truth. The government has the industry in a throttle hold; the best the meetings can be called is "pistol point deliberation."

After steel people "acquiesce" to a contract—or have it imposed on them—it is safe to say a price increase of slightly more than $5 a ton will be granted. Optimists hope that the increase will reach $6 a ton.

The breakthrough in the wage "ceiling" will be the direct result of the WSB stand and that of Mr. Truman. The breakthrough in the price ceiling will be the price to be paid to keep the steel industry from reaching a low point in earnings—and to protect the raw material expansion and the capacity increases.

FALSE ALARM: Workers recharge openhearths after strike's averted.

Special Report

Continued

ated a contract with John L. Lewis' United Mine Workers—a contract that included a 5¢-per-ton royalty to finance a union health and welfare fund. Owners were forced to accept the contract.

Will Fight—There is little question that if this happens the industry will go to court. They feel they would then be able to prove "irreparable" damage as an outgrowth of President Truman's action.

Industry employees are at least technically working for the government, and can be enjoined from striking without regard to the Norris Act. The Supreme Court has ruled that the constitutional guarantee against involuntary servitude does not apply to the government. In the 1946 coal dispute the miners struck when the companies resisted the Lewis-Krug agreement. Mr. Lewis was found guilty of contempt for violating an anti-strike injunction.

Meanwhile the flag flew over the steel industry.

PLASTICS: Tenite Pipe Use Grows

Tennessee Eastman product proves satisfactory in wide variety of uses . . . Corrosion resistance, light weight, coupling ease are features . . . Gas line use seen—*By R. L. Hatschek.*

One man carries a 60-lb bundle of three 20-ft lengths of 4-in. Tenite plastic pipe.

Important in the growing field of plastic pipe is Tennessee Eastman Co.'s Tenite (cellulose acetate butyrate). This thermoplastic is being used successfully in a variety of applications. It appears to be particularly satisfactory for certain process industries.

High corrosion resistance is an outstanding feature. Tenite piping has been used with salt water, crude oil, sour crude oil, natural gas, corrosive earth and installations where electrolytic action had been a headache. No corrosion has been apparent in any of these cases. And smooth walls keep friction head losses to a minimum.

In Australia—Tenite is widely used in Australia. Dissolved minerals make water there highly corrosive, and the country is suffering from an acute galvanized pipe shortage. Down-under applications include pipes for distilled water, aerated water at 100 psi, water for livestock, and waste-carrying water.

The plastic is also used to carry brine, oil, gasoline, beer and fruit juices. An American winery now uses Tenite pipe.

Colorado's Public Service Co. has called Tenite pipe "very promising for gas transmission." Southern California Gas Co. also reports good results. The West Coast firm has found it cheaper to install new pipe than repair leaks. Repair crews merely put a bullet-like nose on a length of plastic pipe and ram it through the old pipe from the main to the house. Smaller diameter of the new length is no problem because of Tenite's low head loss.

Light Weight—One advantage plastic pipe has is lightness. Pipe of 4-in. nominal diam, with 0.15-in. wall thickness, weighs about 1 lb per ft. Australians particularly like this feature since they rely so much on air transport. To reduce volume they telescope different diameters.

Slip sleeve joints are easily made by inserting a length of pipe into a sleeve already cemented to the other length. Adhesive is brushed on and the joint pushed and twisted into position. Joints in clear Tenite can be quickly checked by visual inspection. Bell-type joints are made as simply except that the pipe must be belled by heating in an oil bath and forming over a die.

Light weight and coupling ease enable a 3-man crew to lay up to 4000 ft of 4-in. pipe in a day.

Prices — Tennessee Eastman charges 62¢ per lb for the plastic. Prices of independent extruders who process Tenite into pipe vary widely. One typical producer charges $52.45 per 100 ft for 2-in. pipe and $118.35 per 100 ft for 4-in. These are about equal to $1.17 and $1.18 per lb respectively. Standard seamless threaded steel pipe costs 6.45¢ per lb, or $69.60 per 100 ft for the 4-in. size. But lower shipping and installation costs of Tenite tend to offset the price disparity.

One difficulty is the lack of standard specifications. ID, OD and wall thickness vary from one extruder to another. There is as yet no regular testing procedure. Tennessee Eastman recognizes this difficulty and is pressing for proper standards.

A thermoplastic, Tenite cannot be used at high temperatures. Internal pressures over 100 psi should also be avoided where "normal" wall thicknesses are used.

Tenite Chemical Resistance

Table shows effect of chemicals on immersed pieces of Tenite 3 x 1 x 0.125 in.

	1 Week	1 Month	1 Year
Sodium Chloride 10 pct	1	1	1
Sodium Carbonate 2.5 pct	1	1	1
Caustic Soda 10 pct	1	5S	5
Hydrochloric Acid 10 pct	1	1	5, 9
Sulfuric Acid 3 pct	1	1	1
Sulfuric Acid 30 pct	9	2, 9	2, 9
Nitric Acid	2	2, 9	2, 9
Methanol 5 pct	4	4, 6	4, 6
Methanol 100 pct	8	8	8
Ethyl Alcohol 50 pct	4	5, 6	5, 6
Ethyl Alcohol 95 pct	6	5, 6	5, 6
Gasoline (Regular)	1	1	1
Toluene	6	5, 6	5, 6
Glycerin	1	1	1
Ethylene Glycol	1	1	1
Acetone	8	8	8
Carbon Tetrachloride	6	3, 6	3, 5, 6
Phenol 5 pct	5	7	7

1—No visible change
2—Discolored
3—Warped
4—Bleached
5—Softened
6—Swollen
7—Disintegrated
8—Dissolved
9—Surface attacked
5—Slightly

Industry Gets Chance at AEC Work

Private industry has a new opportunity to tell Atomic Energy Commission what jobs U. S. business can handle in constructing and operating reactors for production of nuclear energy.

AEC says it is willing to accept, before June 1, proposals that will result in greater industry participation in output of fissionable materials and power. Each company or group of companies whose proposal is accepted will work independently.

One year ago, AEC contracted with four groups of firms for investigations designed to broaden the national atomic energy program.

PENSIONS: Industry Has Social Soul

Trend to cash security for older workers grows . . . Working population ages . . . Two basic types of pensions have myriad forms . . . The case for government pensions—*By T. Metaxas.*

Industry is baring its social soul in a mounting interest for pension planning to assure superannuated employees cash security in retirement. Some companies, whose financial solidity and profits prospects are grounded in granite, have wrought model pension plans that not only supplement inadequate Social Security old age payments but dwarf them. Other firms, for basic and unalterable economic reasons, cannot take the total plunge.

Industry's awareness of the need for retirement pensions is not new. Industry has not been a social villain abruptly transformed to a saint. But the ever-increasing needs for pensions and possibilities of indignant public opinion can't be ignored. The working population is aging as man's life span lengthens, and like a magnet industry has drawn labor to production centers, cutting off the worker from the old age benefits of agriculture.

Today, we have nearly 12 million people who are 65 years and over. Millions more are on the brink of this category and gerontologists estimate that by 1980 the number will rise to about 20 million oldsters. Industry is maneuvering to meet the economic threat of a host of older workers dependent on meagre Social Security payments and the whims of charity institutions or relatives.

Greater Growth—In 1929 only 400 pension plans were in effect. Now there are about 13,250—and coverage will increase enormously in the next two decades.

The myriad forms of pension plans range from utopian plenty to skimpiness, dependent on a firm's special circumstances and its economic stamina to pay. Pension motives are to supplement Social Security, give a retired worker security, stabilize labor turnover, and promote efficiency in industry.

In one of two basic types of pension, the employee is required to help finance his old age by contributing through payroll deductions. His participation is voluntary and the company usually makes the more generous contribution. Contributory pensions earn the effect of giving the employee a sense of choice and involvement in his own security. Much larger pensions are possible than if the company had to foot the bill unaided.

The other pension method is non-contributory for the worker. In some plans of either category retirement is compulsory at a fixed age (usually at 65 for men and 55 or 60 for women). Others are compulsory in principle and half-hearted in practice, permitting a varying leeway for the sound and essential employee who does not want to retire. Sometimes the choice of retirement is left to the worker, with provisions open for inefficiency and failing health. Some effort is made to place inefficient employees in less-essential jobs.

Industrialists do not look at pension planning as sheer charity. Aside from the coldly economic aspect of productive young people supporting the unproductive old, management must weed out the old and less capable to assure maximum productivity. Compulsory retirement can yield a younger, more efficient staff with greater chances of promotion.

U. S. Pensions—The American Federation of Labor is now plumping for greater government entrance into pensions. It cites that only through federal auspices can a uniform pension be granted to all. It points out that the threat of a stagnant labor force, afraid to change jobs because pension rights would be lost, would be obviated. Under a U. S. plan a worker could carry his pension to any new position.

Most important, the union warns against mountainous accumulations of pension fund money that would eventually be frozen and useless as it outstrips industry's capacity to absorb investment. The government, though, has a vast potential to absorb investment money.

Despite disclaimers put out by industry, pension plans encourage an already apparent tendency to discriminate against the older man when hiring. To hire a man of 55 and then retire him at 65 with an

Three Model Pension Plans

Standard Oil Co. of New Jersey's Employees Thrift Plan combines pension and savings features. Fixed pension contributions are about 3 pct of pay—on a voluntary basis. For example, a worker earning about $4,000 per year pays $93.60 annually. Two-thirds of that ($62.40) multiplied by number of years service equals the annual pension ($1,248 for 20 years $1,872 for 30). Savings plan permits worker to save from 2 to 10 pct of pay. Company adds 50¢ per dollar on 2 pct, 25¢ per dollar above 2 pct.

In Sears, Roebuck & Co.'s profit-sharing plan, employees may contribute 5 pct of salaries while Sears contributes from 5 to 9 pct of profits to a fund which owns 20 pct of Sears stock.

Kaydon Engineering Corp. has non-contributory plan based on 15 years minimum service. Pay of last 10 years is averaged. An annual pension equal to 1¾ pct of that average multiplied by years of service is paid.

insufficient pension would be construed as putting him out to starve. Yet to keep him on while senescence saps his abilities detracts from one of the most important benefits industry can get from pensions—efficiency.

It seems now that the trend may shift to non-compulsory retirement, that a movement may be made to lift the retirement age, and it's certain that unions will use collective bargaining to the hilt to improve pensions.

Get Proof—For most, the personnel work phase of pensions is in the first stages of spadework. If the non-compulsory retirement feature of pensions is to be maintained successfully, industry must have evidence to defend itself in deciding on retirements. The union is bound to react unfavorably on individual company decisions. What can still these protests are continuing efficiency ratings on older persons.

With all its inconsistencies and dissimilarities, the movement to pensions in industry gathers mass. Companies must take stock of their resources and mold their individual plans, remembering that headlong generosity today can boomerang in the future. Welshing on good intentions provokes hatred and undermines public relations.

Editor Edwin F. Cone Passes

THE IRON AGE reports with sorrow the recent death of Edwin F. Cone, for 20 years an associate editor of this magazine.

"Doc" Cone joined THE IRON AGE before World War I, after a distinguished career as chemist and metallurgist in the steel foundry industry. In 1935 he became editor of *Metals & Alloys* (now *Materials & Methods*), a post he held until 1947. He retired from the staff of that publication in 1947.

A member of A.S.T.M., A.I.M.E., The Electrochemical Society, A.F.S., and National Conference of Business Paper Editors, he held many posts in these organizations. During World War II he served on the Washington staff of the U. S. Government's War Metallurgy Committee.

Uranium Mine Access Roads

Governmental approval has been given for construction of 45 access roads, involving a total of 1250 miles and expenditure of $6 million, to bring out uranium and other critical ores.

A few have been completed, and work on the remainder has started. Of the total, seven roads totaling 810 miles provide access to uranium deposits and workings.

Diamond Salvage Booklet Ready

Diamond conservation procedure is outlined in a new Commerce Dept. booklet, *Salvage Industria. Diamonds for Defense.*

It offers suggestions for maximum use of available supplies. It emphasizes that about 50 pct of all bort used in new diamond wheels can be salvaged. The booklet is available at Commerce Dept. field offices.

Bulldozer Manhandles Car Wrecks

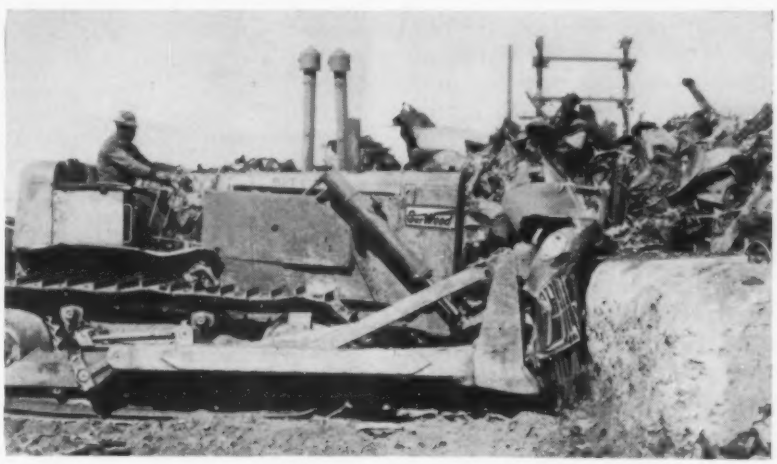
Scrap dealers are forever wracking their brains to find ways to prepare junked cars for easier, quicker handling. Jalopies have been ripped apart on steel poles, flattened by the sledge-hammer blow of heavy armor plate dropped by a crane—and finally a construction bulldozer has been called in to crush the wrecks against a stone wall.

The Compressed Steel Co. of Denver has outfitted an Allis-Chalmers tractor with a Gar Wood Hydraulic Mounted Dozer blade. The up-and-at-'em power of the tractor smashes car bodies like match boxes. The usual procedure of removing frames is unnecessary.

The tractor maneuvers a jalopy against a concrete bunker. One thrust forward is all it takes. Then the tractor completes its chores by pushing the "pancake" to a crane which feeds the scrap baler. Compressed Steel Co. claims that the tractor and attachment can crush 75 car bodies per day, enabling the baler to work at a rate of 150 tons for each 18-hr working day.

The car wrecking industry's response to government and steel producers' pleas for more scrap has been above the call of normal duty. Guided by National Production Authority's inventory turnover order (M-92), graveyards helped enormously in supplying that thin margin of scrap safety that got steelmakers over the hump last winter.

Yet car wreckers have been skating on economic thin ice because of the weakness of the cast scrap market which prevents them from selling all their cast.



CANADA: Growing Giant of Minerals

Vast progress leading to full development of rich resources of minerals . . . A big producer will become a giant . . . Will aid both Canada, U. S. . . . Huge iron ore, nickel shipments destined.

The northern flower of the American land mass is beginning to bloom. Canada is rapidly unfolding a colorful story of great progress—of developing rich resources, of an expanding economy, of building new cities and new industries, of counting heavily in the Free World's growing inventory of might.

Source of this accelerating progress is Canada's tremendous wealth of natural resources. Though this revolutionary development is of primary interest to Canadians, it is of profound concern and benefit to Americans as well.

Common bonds between these two nations have grown stronger through the years, and the people are so similar they hardly recognize a border. U. S. firms are expanding in Canada. U. S. capital is helping unlock Canada's treasure chest of natural wealth. And the U. S. will continue to be Canada's biggest customer, as well as its biggest supplier. Last year 59 pct of Canada's exports came to America and the U. S. supplied Canada with 65 pct of its imports.

Giant Already—Still a youngster in mineral production, the surface of its natural wealth merely scraped, Canada is one of the world's leading mineral producers. It provides over 80 pct of the free world's nickel, 70 pct of its asbestos, is fourth in output of copper, lead, second in zinc, and a leader in uranium and platinum. Also on Canada's production roster are aluminum, cadmium, cobalt, magnesium, titanium, calcium, tin, tungsten, gypsum, quartz, gold, and other minerals.

The Research Institute of America observes that Canada will become increasingly important as a supplier of basic materials to the U. S. production plant. American dollars have been crossing the border in mounting millions. Total U. S. investment now is about $8 billion, controlling some 2500 plants which constitute from a third to a quarter of Canadian manufacturing capacity.

Canadians are clear-sighted on the potential of their country. "Some of the most spectacular projects are the tooling-up stages for the great future," said Honorable Robert H. Winters, Minister of Resources and Development, at a recent gathering. He spun a fabulous story of minerals exploitation, commenting on the rush to file mining claims.

The stress is on development of hydroelectric power, he said. It's proceeding at an unprecedented rate. "With 13,340,774 hp of capacity installed, Canada has but harnessed only one-quarter of its known potential." Between 1939 and 1951, hydroelectric capacity was increased 60 pct. Development continues at 2½ times the pre-war rate.

Iron Ore—Within a short period of 2 years (1953-1955) iron ore production north of Lake Superior may be tripled, reaching 10 million tons annually. Ore shipments are expected to begin in 1955 from Labrador-Ungava mines, yielding an initial output of 5 million tons. Facilitated by the St. Lawrence Seaway, production could climb to 20 million annual tons. Other iron ore bodies exist in Canada, Mr. Winters said. Exploiting these may in the next decade bring ore production from the current 4.7 million annual tons of 33 million.

A $50 - million nickel - copper project in Manitoba's Lynn Lake area should be producing in 1953. An annual output of 8500 tons of nickel and tonnages of copper sulphide and cobalt are expected by 1955. Aluminum Company of Canada's project in British Columbia is expected to bring in from 80,000 to 100,000 metric tons of new aluminum capacity by 1955. Canadian output of aluminum in 1951 ran about 28 pct of the world total—and 90 pct of it was exported.

Ready for Atom—Canada promises to be a leader in titanium metal production. A recent mineral discovery is the ilmenite (titanium ore) field at Allard Lake, Quebec, which may be the largest in the world. Furnaces are processing the ore at Sorrel. The world is entering the atomic age and Canada has not lagged, already being a major uranium producer because of its mines at Great Bear Lake, Northwest Territories. Another mine is being developed in Saskatchewan.

Oil production has increased in 5 years from a level of supplying 10 pct of Canadian needs to close to half today.

Canada stands at the threshold

Starting Next Week

Starting next week you'll be able to follow the tremendous development of Canada in a regular Iron Age feature. Called "Canadian Outlook," the weekly column will give details on metalworking, mining, business and financial developments.

Its writer will be F. Sanderson, who has been an Iron Age correspondent for 42 years. In addition to his work for The Iron Age Mr. Sanderson published his own mining magazine for many years, after winning his spurs as a financial and business writer for Canadian newspapers. He is widely known in Canadian industrial and mining circles, and he knows how to write the kind of stories Iron Age readers want.

To keep up to date on Canada be sure to read "Canadian Outlook" each week.

of great minerals production. Circumstances have held back development but today the rush is on. Both Canada and the United States realize that their future, political and economic, is intertwined. Both countries can be expected to reap the benefits of boundless new natural resources in mutual profit and assistance.

Pig Iron:

Experimental low shaft furnace to run on poor quality coke, ore.

Representatives of American steel and iron producing companies recently met in Pittsburgh to hear an outline of plans for an experimental low shaft blast furnace to be built at the Ugine Works, Liege, Belgium.

Purpose of the semi-commercial furnace will be to study methods of pig iron manufacture by use of poor quality ore, ore fines, and poor quality coals.

The furnace has been erected, but gas-cleaning and skip hoist equipment are only partly constructed. Plans also call for manufacture of briquettes of coal, ore, and flux.

The furnace is to have an oval hearth 9.8 ft by 4.9 ft. It will have a straight cylindrical shaft 20 to 22 ft high. And six tuyeres will be used for combustion. It is expected to be placed in operation by the end of this year.

Scope of Experiments—The general program of research consists of studying the possibility of using low quality (minette) ores in the blast furnace employing ore fines, coke dust and low quality semi-coke and pellets made of ore fines and raw coal.

Fuel, air and pressure will be varied to provide 24 separate experiments. The variables are: Normal coke, fine coke, refined coal pellets, raw coal pellets, ordinary air, enriched air, pure oxygen, normal pressure and high pressure. The furnace is being constructed so that pressure up to 35 psi may be used if desired.

Among the participating countries are Belgium, Luxembourg, The Netherlands, France, Italy, England and Greece. Battelle Memorial Institute in the U. S. is also a member. Other countries expressing interest in the project are Japan, India, Brazil and other South American countries.

The Pittsburgh meeting was arranged in cooperation with the Office of Technical Services (Dept. of Commerce) and Bureau of Mines (Dept. of Interior). In attendance were 39 experts representing 10 steel producing companies, 3 merchant pig iron producers and other organizations. American firms were invited to join in sponsoring the blast furnace project.

Ore:

British developing new sources; supply outlook for 1952 good.

Judging from delivery contracts already signed, Britain's iron ore outlook is better than it was a year ago. There is reason to hope that 1952 imports will pass the record high set in 1951.

As a result of recent conferences, England expects the U. S. to reduce its demands on European ore sources by 750,000 tons. In 1951 this demand was just over 3 million gross tons, against 1 million tons in 1946-47 and 500,000 before the war. More ore from the American-controlled mine in Liberia has already been made available.

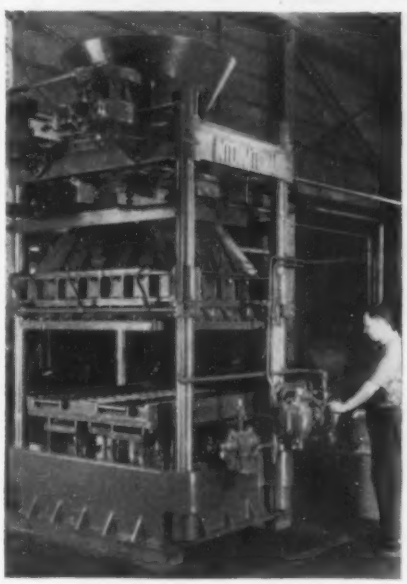
The British iron and steel industry, together with French and Canadian interests, is surveying large iron ore deposits in Mauretania, on the edge of the Sahara. Enough information should be available by the end of this year to determine if development is practicable.

From Africa—Long-term agreements with the Dominion Coal & Iron Co. of Canada provide for increases in the exportable surplus from Wabana for 1952 and several years ahead.

Joint Anglo-French development in Conakry, West Africa, is making good progress. Deliveries should begin by the end of this year. There is room for considerable additional expansion of the initial project if needed.

The company now working the mines at Marampa (Sierra Leone) is investigating the possibility of developing ore deposits further inland. This would take some years, as an 80-mile railway extension must be built and port facilities increased.

In Labrador the United Kingdom expects to obtain by about 1955 some share of the fields now being developed by Canadian and American interests. Norway, Sweden, Algeria, French Morocco and other traditional sources are being offered financing and mining machinery on easy terms by Britain in exchange for more output.

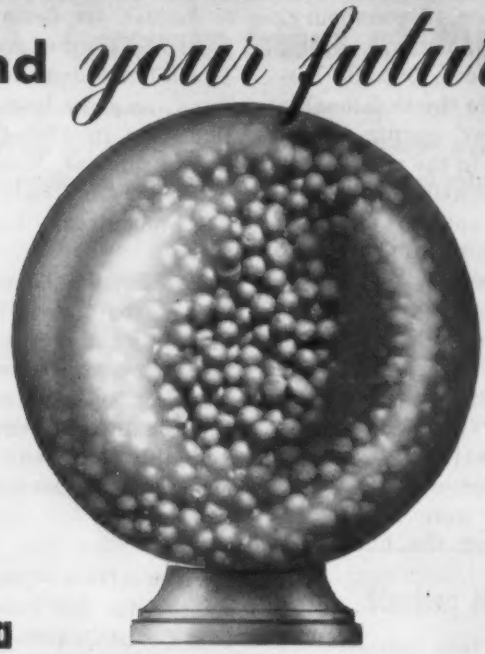


BIG BLOWER: This International Molding Machine Co. sand blower, now making jet parts at Ford's Aircraft Engine Div., is one of the world's largest. Handling up to 2 tons of sand, it will blow cores weighing as much as 1500 lb.

GM-Canada Adds New Truck Line

General Motors of Canada, Ltd., will build a new truck assembly plant at Oshawa, Ontario, to cost $10,000,000, according to William A. Wecker, president. The new unit is planned to be completed and in operation early next year. While

TRU-STEEL SHOT
and *your future*



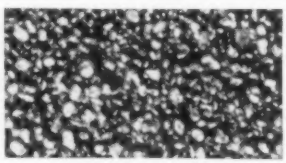
what a
PERFECTED TRUE STEEL SHOT means to you

Like everyone else you are interested in lowering cleaning room costs and Tru-Steel Shot has a place in your future. That's because Tru-Steel Shot is setting new records for longer life and lower blast cleaning costs. It is reducing handling costs and maintenance time. WHY? Because Tru-Steel NEVER SHATTERS.

Industry has long been searching for an abrasive that won't shatter because doing so ends its effective cleaning life. Annealing and drawing have been tried with some degree of success. But only a true steel shot never shatters. TRU-STEEL has the toughness that only steel can give. Then to make it even more durable, Tru-Steel is *fully heat treated,* not just drawn and annealed. As a result, Tru-Steel lasts longer, cleans faster . . . costs less in the long run.

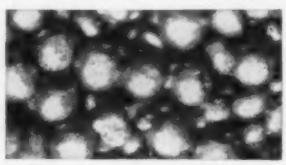
There are big savings ahead for you when you use Tru-Steel Shot.

LIFE COMPARISON -TRU-STEEL vs. CHILLED IRON SHOT



CHILLED IRON
No. 230 at Mag. 10x

after 1500 passes



TRU-STEEL
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THIS BULLETIN GIVES YOU THE FACTS
It shows where the average blast cleaning dollar is spent and how savings can be made. Send for your copy today.

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WHEELABRATOR & EQUIPMENT CORP.
510 S. Byrkit St., Mishawaka, Ind.

—International—
Continued

the company still is making alterations to blue prints prepared by Allward and Gouinlock, the principal construction contract for the plant has been let to the Piggott Construction Co. Ltd., Hamilton, Ont. The building will be a one story structure covering more than 17 acres, providing 741,000-ft of floor space and will add 25 pct to the General Motors floor space at Oshawa.

Ships in Foreign Waters for Sale

Maritime Administration wants to sell 14 war-damaged ships now lying in foreign waters and will open submitted bids at 2:30 p. m., Apr. 29.

Bids will be accepted from anyone, U. S. citizens and aliens alike, but the government reserves the right to reject any or all bids for the ships, which are mainly of the Liberty type.

Sale will be made on an "as is" basis except that all salvageable cargo which may be found on ten specified vessels is to be turned over to the government.

Dutch Install New Slabbing Mill

West Europe's steel rolling capacity has been increased almost 500,000 tons per year by the opening of a new blooming and slabbing mill in the Netherlands.

New mill is part of an expansion program being carried out with U. S. aid by Royal Dutch Blast Furnace & Steel Co. at Ijmuiden, The Netherlands. Total cost of the program is estimated at $47,010,000. U. S. aid amounts to $23.5 million.

Lauds Western Ontario Steep Rock

Steep Rock mines in Western Ontario are believed to have an ore potential of as much as 500 million tons of iron ore per 1000 ft of depth, according to M. S. Fotheringham, president of Steep Rock Iron Mines, Ltd. Mines are believed to have a minimum depth of 3000 ft, making a total potential of at least 1.5 billion tons.

Power Projects Get Tax Writeoffs

Defense Production Administration last week approved tax amortization certificates for 25 electric power projects. New facilities are expected to add almost 1.5 million kw to the nation's power supply. (THE IRON AGE, Apr. 3, 1952, p. 103.)

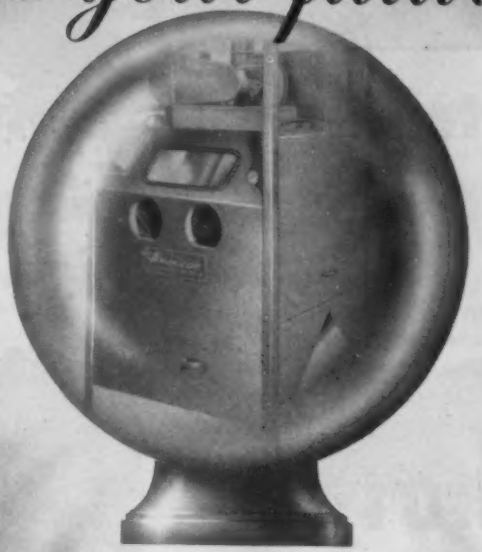
A total of 175 power projects have received fast tax writeoffs to date. DPA estimates they will increase power capacity by 10,607,955 kw. Total cost of the projects is about $1,639,311,194. Of this, $1,599,113,813 have been approved for rapid tax amortization.

National Tool Has Record Year

Record sales amounting to $6,113,278 were achieved during 1951 by National Tool Co., Cleveland, compared with $3,137,290 in 1950. Net income for the company came to $248,661, up from the previous year's net earnings of $168,860. Only a small portion of last year's high sales can be traced directly to the defense effort, according to Harry W. Barkley, president. He attributed the increase to the company's expansion program started in 1946 and an enlarged nationwide sales force. Backlogs of orders at the end of last year came to $2,225,692 and are still coming in at a satisfactory rate.

"Somehow the subject was changed from my raise to the beauty of simple living."

LIQUAMATTE
and *your future*

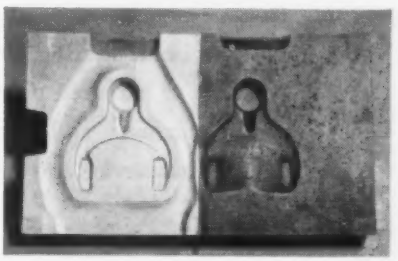


what
SIMPLIFIED WET BLASTING means to you

The cost of close tolerance finishing can vary almost as much as the weather. Through development of wet blasting, large savings have been made possible in finishing costs . . . and now Liquamatte makes wet blasting EVEN MORE practical, economical and convenient. The Liquamatte has 14 advanced design features that overcome the many operating difficulties usually found in wet blasting. Thus it reduces finishing costs to the very minimum. With the Liquamatte, "hand" finishes are produced mechanically in a matter of seconds, eliminating many tedious operations. Precision parts can be processed while holding tolerances of .0001". Scale and directional grinding lines are uniformly removed, greatly prolonging the life of expensive tools and dies.

Liquamatte's 14 advanced design features mean 14-way savings for you. Send for Bulletin 23 and see.

Typical heat treated forging die, one half of which has been cleaned with the Liquamatte using a fine mesh Liquabrasive.



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It shows how Liquamatte's simplified design has reduced precision finishing costs to a new low.

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72 pages . . . illustrations and specifications on the most complete line of carbide cutting tools. Send for your copy today.

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—Research—

Steel:

Experimentation keeps pace with industry's capacity expansion.

Research in steel and steelmaking materials is keeping pace with the steel industry's expansion program, Dr. R. E. Zimmerman, consultant to U. S. Steel Co., told the Annual Symposium of the Engineers Council of Houston last week.

Dr. Zimmerman said that major advancements in research for new and better steels are continuing rapidly. "Research and development in the steel industry are continuous and continuing; they cannot be allowed to come to a stop."

He pointed out that even during the worst depression years of the 1930s, when annual steel output sunk as low as 15 million tons, research continued. Knowledge gained then was essential to the war effort, he reminded his audience.

Production has necessarily been the main objective in the enormous postwar demand for steel, but, Dr. Zimmerman noted, "Research in materials has gone hand in hand with each and every activity, seeking to enlarge the usefulness of steel to serve the requirements of various difficult situations which have arisen."

Raw Materials—Critical shortages of steelmaking raw materials are a major challenge to researchers today, he said. He gave as an example the scrap shortage, which has stepped up the use of hot metal in steelmaking furnaces. Thus the whole field of blast furnace operation has been brought under careful review.

Loss of Russian manganese has intensified research on manganese recovery from openhearth slag and and lean domestic ores. Excess of demand over supply of aluminum has pushed the search for possible substitute deoxidizing agents.

Dr. Zimmerman cited the "National Emergency Steels" developed during World War II. These steels stretched the supply of al-

loying materials to produce almost twice the tonnage previously thought possible. Boron steels are now cutting the needed amount of alloying material in half again.

Tinplate—Reviewing the developments in tinplate, Dr. Zimmerman spoke of improvements both in the product and in the method of manufacture. He told of an Army Quartermaster Corps report that the useful life of tin can food containers has been increased by at least a third in the last two decades. In some cases can life has been more than doubled.

He recalled that the electrolytic plating process, cutting tin requirements more than 50 pct, had been perfected just prior to World War II. Further development has now led to coatings using as little as one-fifth the tin previously needed.

Dr. Zimmerman outlined recent developments in heat treating which have produced higher quality, more versatile steels. In some cases heat treated carbon steels can serve purposes for which alloy steels are normally specified.

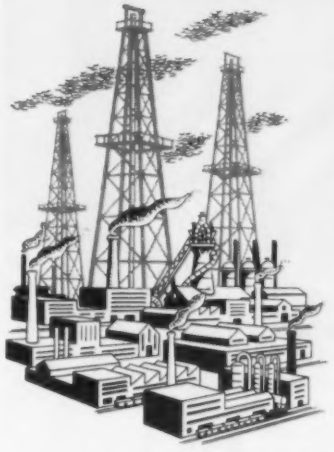
Stainless—In stainless steel he noted the development of a special grade of chromium stainless for better television tubes, and the comparatively new "Stainless W," capable of strength of 180,000 to 190,000 psi.

He particularly stressed the notable advances in oil country goods, mentioning a recent oil well casing with a known yield point of 110,000 psi. Another development is a new casing joint, which, in tension, exhibits approximately the same strength as the pipe itself without needing an increased cross-sectional area of the ends by upsetting. Also new is a method whereby seamless pipe for transmission lines will be expanded by new type equipment to produce stronger pipe to handle the higher pressures adopted for oil and gas transmission.

More Natural and Coke Oven Gas

Now Used in

Birmingham District than Greater New York



SOUTHERN NATURAL GAS COMPANY – headquarters Birmingham—has increased its system's capacity more than 175% in the past five years. This Company transports natural gas to Alabama and adjacent States. Alabama Gas Corporation, a subsidiary, distributes this gas to the Birmingham district and 32 municipalities in central Alabama. It also distributes coke oven gas, produced in Birmingham, to users in this area. Construction of 109 new coke ovens by Alabama By-Products Corporation, Sloss-Sheffield Steel & Iron Company and Republic Steel Corporation will increase this coke oven gas supply 33 1/3% by early 1952.

Christopher T. Chenery, Chairman of the Board of Southern Natural, has cited these reasons for his Company's great growth:

"Our Company's expansion mirrors the spectacular advance of the Birmingham district and our markets in the Southeast. Our section has become one of the country's important industrial areas. Transition from a cotton-dominated region to one of diversified industry and agriculture has been an outstanding factor in its economic progress. This has helped create a buying power that today absorbs a steadily increasing volume of manufactured goods. Growing purchasing power of the colored population has likewise been most important. Their living standards have risen remarkably fast. Our Company foresees acceleration of the present industrial development throughout our territory. This is why we have projected a further long-range program to provide additional capacity, far exceeding that we have today."

• • • • • • •

Central district of the Southeast is Birmingham. The Committee of 100 or any of the undersigned members of the Executive Committee will welcome your inquiries for specific, confidential data regarding the advantages of this district for your plant, office or warehouse.

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Today the dollar-saving importance of these Kinnear advantages is getting closer attention from building designers everywhere. As building *construction, operation* and *maintenance* costs continue to rise, the space, time, labor *and construction costs* that can be saved with efficient doors are major items in any business operation.

Kinnear's rugged curtain of interlocking metal slats opens straight upward. It coils compactly out of the way above the opening. Floor, wall and even ceiling space remain fully usable at all times. The door clears the opening from jamb to jamb, and from floor to lintel, completely out of traffic's way. When open, it is safe from damage by wind or vehicles. When closed, it presents an all-metal barrier that assures extra protection against storms, intruders, and fire.

In addition, Kinnear Rolling Doors provide smooth, easy operation under all conditions. They may be controlled manually, mechanically (by chain or crank) or electrically. Motor operated doors can be equipped with any number of remote control switches, for highest convenience. Kinnear Rolling Doors are built of various metals, in any size, for easy installation in old or new buildings. Let us send you complete information.

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Defense Contracts

Government Inviting Bids

Latest proposed Federal procurements, listed by item, quantity, invitation No. or proposal, and opening date. (Invitations for Bid numbers are followed by "B," requests for proposals or quotations by "Q.")

Ordnance Tank Automotive Center, Detroit.
Channel seat bottom cargo body, 54133, 52-2958B, May 2.
Hinge, cargo body tool box door assy, 3060, 52-2958B, May 2.
Cap, dust, fuel tank, 900, 52-2958B, May 2.
Bracket, cargo body, 6456, 52-2958B, May 2.
Bearing, ball, 9350, 52-2997B, May 2.

Corps of Engineers, U. S. Army, Pittsburgh.
Curb, deck, steel, 1040 ea, ENG-36-058-52-112B, Apr. 24.
Post, handrail, 4212 ea, ENG-36-058-52-112B, Apr. 24.

Army Chemical Center, Maryland.
5 items of spare parts for flame thrower, 800 ea, 52-446, Apr. 24.

Mallory AF Specialized Depot, Memphis, Tenn.
Bolts and nuts, var types and sizes, 231650 ea, 40-604-52-99B, May 1.

Detroit Arsenal, Centerline.
Pump assy heater fuel, 2325, 52-271B, May 2.

Philadelphia District Corps of Engineers, Philadelphia.
Rod anchor oval eye, 1000, Eng-36-109-52-281B, Apr. 14.
Rod ground galv, 300, Eng-36-109-52-281B, Apr. 14.
Plate receptacle 1 gang, 10000, Eng-36-109-52-282B, Apr. 15.
Plate-switch brown 1 gang, 7000, Eng-36-109-52-282B, Apr. 15.
Receptacle flush, 1500, Eng-36-109-52-282B, Apr. 15.
Receptacle lamp, 16000, Eng-36-109-52-282B, Apr. 15.
Receptacle plug, 3000, Eng-36-109-52-282B, Apr. 15.
Siren vehicle, 400, Eng-36-109-52-285B, Apr. 18.
Support floodlight, 150, Eng-36-109-52-286B, Apr. 17.
Reel, wire, 5033, Eng-36-109-52-268B, Apr. 9.
Sprayer, duster, 100, ENG-36-109-52-269B, Apr. 11.
Pump, centrifugal, 303, ENG-36-109-52-274B, Apr. 11.
Pump, diaphragm, 156, ENG-36-109-52-274B, Apr. 11.

Watervliet Arsenal, Watervliet, N. Y.
Steel screws part for 105 MM howitzer, 4000 to 6400 ea, 52-140B, May 2.
Aluminum bronze screw part for 105 MM howitzer, 15000 ea, 52-140B, May 2.
Aluminum staff section assembled part for gun, 1980 to 3220 ea, 52-137B, May 5.
Steel chamber evacuators assembled part for gun, 100 to 1400 ea, 31268Q, Apr. 28.
Yoke assy part for 60 MM mortar, 2082 ea, 52-139B, Apr. 28.

General Stores Supply Office, Penn.
Boxes tool steel, 6600 ea, 1 1015B, Apr. 18.

Navy Purchasing Office, Washington.
Tool, burnishing surface relay contact, 25373, 4080Q, Apr. 22.
Head cutter, 3000, 6460B, Apr. 21.
Jacks, screw, 2800, 6463B, Apr. 21.

St. Louis District Corps of Engineers, St. Louis.
Bolt machine, 971609 ea, Eng-23-065-52-767B, Apr. 25.
Bolts stove, 85000 ea, Eng-23-065-52-767B, Apr. 25.
Bolts std, 6000 ea, Eng-23-065-52-767B, Apr. 25.
Nut machine screw steel, 30000 ea, Eng-23-065-52-767B, Apr. 25.
Nut regular steel, 12000 ea, Eng-23-065-52-767B, Apr. 25.
Valves iron, 2367 ea, Eng-23-065-52-756B, Apr. 25.
Valve brass line shutoff, 33250, Eng-23-065-52-742B, Apr. 23.
Valve brass, 12440, Eng-23-065-52-737B, Apr. 24.

Contracts Reported Last Week

Including description, quantity, dollar value, contractor, and address:

Repair parts automotive, 84 1 itms, $22,597, Ford Motor Co., Dearborn.

Parts for automotive electrical parts, 145 1 itms, $24,940, United Motors Service Div., Detroit.

Repair parts, 180 1 itms, $30,164, The Seagrave Corp., Columbus, Ohio.

Repair parts for locomotive, 2400 ea, 2000 ea, $46,724, Baldwin-Lima-Hamilton Corp., Lima, Ohio.

Spare parts, 581 1 itms, $55,116, International Harvester Co., Los Angeles.

Spare parts & attachments, 10 1 itms, $156,641, Bay City Shovels, Inc., Bay City, Mich.

Replenishment of hardware, 841300 lb, $38,255, Bethlehem Steel Corp., Bethlehem.

Replenishment of hardware, 5581 ea, $65,967, General Electric Co., Providence.

Replenishment of motor vehicle parts, 5900, $438,665, Northwestern Auto Parts Co., Minneapolis.

Replenishment of tank & combat vehicle parts, 1450 ea, $43,761, James Cunningham Son & Co., Rochester.

Replenishment of hardware, 1767562 lb, $153,848, Rep. Steel Corp., Massillon, Ohio.

Replenishment of hardware, 4113299 ea, $42,918, Rep. Steel Corp., Cleveland.

Replenishment of tank and combat vehicle parts, 10000 ea, $45,200, E. A. Laboratories, Inc., Brooklyn.

Replenishment of motor vehicle parts, 13500 ea, $75,600, Eaton Mfg. Co., Detroit.

Replenishment of motor vehicle parts, 1010 ea, $30,896, Industrial Mach. Co., Shreveport, La.

Replenishment of motor vehicle parts, 38000 pr, $34,205, Thermoid Co., Trenton, N. J.

Replenishment of tank & combat vehicle, 883000 ea, $247,863, The Gates Rubber Co., Detroit.

Replenishment of motor vehicle parts, 700 ea, $1,096,025, Biederman Motors Corp., Cincinnati.

Guard, trigger, 228536 ea, $30,866, H. L. Judd Co., Wallingford, Conn.

Screw, gas cylinder lock with valve assy, 74105 ea, $45,336, The New Haven Clock & Watch Co., New Haven, Conn.

Valves and repair parts, 13875, $131,152, Crane Co., Chicago.

Repair parts for main propulsion and auxiliary turbines, 4811, $201,966, General Electric Co., Philadelphia.

Repair parts for refrigeration equipt, 22953, $127,199, Carrier Corp., Syracuse, N. Y.

Repair parts for gyro compasses, 9802, $104,004, Arma Corp., Brooklyn.

Repair parts for gasoline engines, 53224, $172,325, Outboard Marine & Mfg. Co., Waukegan, Ill.

Repair parts for diesel engines, 28593, $392,395, General Metals Corp., San Francisco.

Repair parts for reduction gears, 2438, $59,641, The Falk Corp., Milwaukee.

Valves and repair parts, 1198, $27,557, Walworth Co., New York.

Pressure reducing valves, 72, $25,794, Grove Controls, Inc., Oakland, Calif.

Temperature regulating valves, 702, $41,671, Robertshaw-Fulton Controls Co., Knoxville, Tenn.

Magnetic door holders, 653, $46,068, Cutler-Hammer, Inc., Milwaukee.

Electric motors and repair parts, 1066, $60,866, Electric Boat Co., Bayonne, N. J.

Repair parts for rotary pumps, 2037, $29,835, Northern Ordnance Inc., Minneapolis.

Repair parts for steam turbines, 437, $41,365, Allis-Chalmers Mfg. Co., Milwaukee.

Temperature regulators and repair parts, 434, $36,458, Robertshaw-Fulton Controls Co., Knoxville, Tenn.

Fuse, igniting M208, 42400 ea, $26,699, Spencer Explosives, Inc., Spencerport, N. Y.

Metal components of pot, smoke, exceeds $250,000, Niles Steel Products, Niles, Ohio.

Booster, M21A4, 1816000, $1,579,920, Scripto Mfg. Co., Atlanta.

Hydraulic control mechanisms, 3050 ea, $84,409, Sperry Products, Inc., Danbury, Conn.

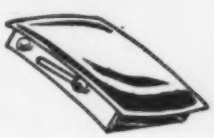
Metal parts for primer, percussion M47B2, 1000000 pieces, $251,000, King-Seeley Corp., Ann Arbor, Mich.

Tank automotive spare parts, 124734, $3,140,925, Continental Aviation & Eng. Corp., Detroit.

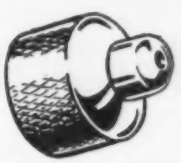
Are YOU getting BURNISHING results like these?

Metal plants throughout the nation have found an Oakite material that meets their highest requirements for burnishing steel, stainless steel, brass, aluminum, magnesium, lead alloys, zinc alloys and other metals. Oakite Composition No. 3 gives RICH SUDS in hard or soft water; LUBRICATES SMOOTHLY to prevent metal-on-metal scratching; RINSES FREELY leaving no soapy film on work, balls or stones; IMPROVES LUSTER quickly at low cost per unit. Here are a few examples:

A MANUFACTURER OF AIRCRAFT INSTRUMENT PARTS uses Oakite Composition No. 3 in all tumbling and burnishing barrels. Results are splendid on castings, stampings and machined parts of steel, copper, brass, bronze, aluminum and magnesium . . . "Steel gear plates look like mirrors. Pinions are polished to the roots of the gears. Magnesium parts are brilliant" . . . "Oakite Composition No. 3 is here to stay."



A BRASS AND STEEL PROCESSOR formerly burnished these metals from 3 to 5 hours before lacquering or bright nickel plating. Oakite Composition No. 3 now makes the work "definitely brighter" in 1 to 1½ hours. "A tremendous saving."



A MAKER OF SURGICAL INSTRUMENTS had rejects as high as 20 % when burnishing hypodermic needle hubs. Since switching to Oakite Composition No. 3, rejects have been "as low as 1 %."

A MANUFACTURER OF ALUMINUM CASTINGS believes—after using Oakite Composition No. 3 for 4 years—that it is "the best material ever made for ball burnishing aluminum."

Send for FREE BULLETIN giving interesting facts about OAKITE COMPOSITION No. 3.

For full information about burnishing with Oakite Composition No. 3—including methods for cleaning and bright-dipping before burnishing, and for keeping balls, stones and barrels in good condition—write to Oakite Products, Inc., 30H Rector St., New York 6, N. Y.

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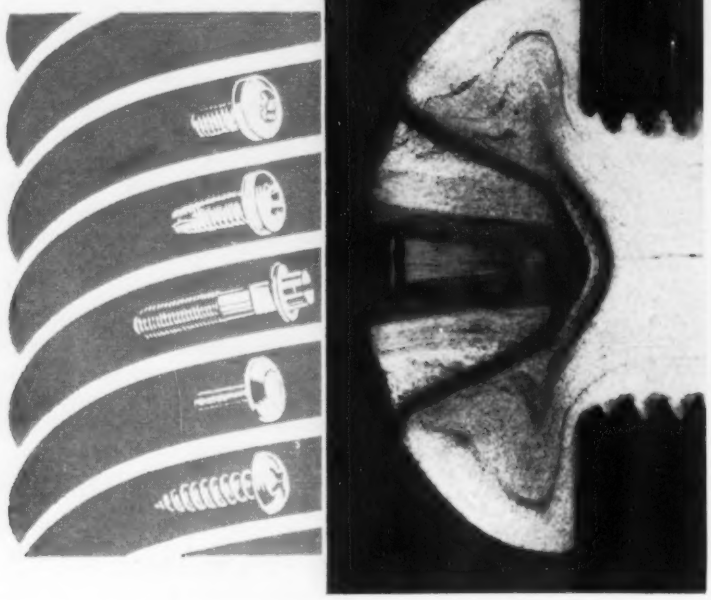

Thousands of "tough-to-make" pan-head recessed screws are made every day from Keystone "Special Processed" Cold Heading Wire. The extremely severe displacement of metal during manufacture of this type head requires special wire that will flow with unbroken fibres. (The above macrograph clearly shows long unbroken flow lines.)

Carefully selected ingredients; our own exclusive drawing and heat treating processes; rigid quality control and inspections — make Keystone "Special Processed" Cold Heading Wire the most suitable for this and other unusually difficult cold heading problems.

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Keystone Steel & Wire Company

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—Construction—

Steel Inquiries and Awards

Fabricated Steel Awards this week include the following:

3330 Tons, Boston, John F. Fitzgerald Expressway, furnishing, erecting and painting steel superstructure. Bethlehem Steel Co., Pittsburgh. Low bidder.

200 Tons, New London, Conn., turbo-generator foundation for Connecticut Light & Power Co., to Bethlehem Steel Co., Bethlehem.

Fabricated Steel Inquiries this week include the following:

1976 Tons, Fayette County, Pa., divided highway and two bridges, State Highway and Bridge Authority, Harrisburg, Pa. Bids to May 9, 1952.

1723 Tons, Northampton County, Pa., deck plate girder bridge, one I-beam bridge, divided highway including an I-beam bridge. Pa. Department of Highways, Harrisburg, Pa. Bids to May 2, 1952.

Reinforcing Bar Awards this week include the following:

3100 Tons, Philadelphia, Diamond St. Housing Project, Lauter Construction Co., same city, general contractor.

1050 Tons, Trenton, water filtration plant for City of Trenton, Easter Engineering Co., Atlantic City, N. J., general contractors, to Bethlehem Steel Co., Bethlehem.

500 Tons, Philadelphia, 10th and Norris Streets Housing Project, McCloskey & Co., same city, low bidder.

300 Tons, Whitemarsh, Pa., Whitemarsh Township High School, McCloskey & Co., Philadelphia, low bidder.

250 Tons, Philadelphia, water treatment facilities at Philadelphia Navy Yard, Robert E. Lamb & Son, same city, general contractors.

Reinforcing Bar Inquiries this week include the following:

2066 Tons, Boston, John F. Fitzgerald Expressway, construction of deck, electrical work and snow melting system. Work will include all ramps between this section of expressway and connecting streets. The elevated highway structure will be single and double deck of the viaduct type consisting of multiple spans of steel stringer and girder construction supported by steel and concrete bents. Bids due Apr. 22, 1952.

406 Tons, Northampton County, Pa., deck plate girder bridge, one I-beam bridge, divided highway including an I-beam bridge. Pa. Department of Highways, Harrisbug, Pa. Bids to May 2, 1952.

Providence Area Building Aided

Commercial projects for the Providence area (Rhode Island and Bristol county, Mass.) stand a good chance of getting construction approval and materials.

National Production Authority last week added this region to six other areas—Boston (including the cities of Lawrence and Brockton) New York, Los Angeles, San Francisco, Portland, Ore., and Seattle—which have been classified as hardship areas for building trades employment.

You can't stop a raging fire with a garden hose

You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings . . . they can't protect surfaces against the ravages of rust for any appreciable length of time.

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FIRST—Unlike maintenance paints, Bitumastic® Protective Coatings are specially formulated from a base* of coal-tar pitch that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

FURTHER—Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. And these coatings provide up to 8 times the film thickness of conventional paint coatings.

FINALLY—Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

**Hi-Heat Gray contains a metallic base.*

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DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

STEEL: Shipment Ban Withdrawn

NPA revokes Direction 10 after seizure order forestalls strike . . . Swift return to full output ends need for controls . . . NPA boss Fowler query prompted action—*By R. N. Stroupe.*

Exhibiting that it can change directions while standing still, National Production Authority last week revoked its Direction 10, issued to control steel shipments in anticipation of a worker strike.

Purpose of Dir. 10, notable in part for its short life, was to freeze all mill and warehouse shipments except those bound for high-priority military and defense-supporting programs. Ink was scarcely dry on this order before NPA amended it with Dir. 10A, lifting the block on deliveries from mills.

As a result, a sizable portion of the industry found itself the victim of a hidden-ball trick. Smaller mills and fabricators, in particular, were bewildered concerning what steel could be shipped and to whom.

Back to Normal — Then Commerce Secretary Charles Sawyer, named czar of the steel industry by President Truman's seizure edict, became aware that plants throughout the country were returning rapidly to top-level production. A query from NPA Chief Henry Fowler prompted Mr. Sawyer to recommend dropping of all portions of the freeze order.

In a letter to Mr. Fowler, he said a poll of steel company presidents had indicated normal production soon would be reached. Therefore, Mr. Sawyer added, scrapping of controls on shipments would "cause the least amount of inconvenience to the public and the businessmen involved."

Revocation of Dir. 10 brought a halt to activities of the government's 3-man special committee appointed before the strike deadline date to insure that steel for military and atomic energy purposes would continue to be available. It is not expected that the group, which never produced a directive, will be disbanded officially.

The freeze order was merely a temporary device through which essential defense production would get first call on available steel in the event of a strike. Since the strike was averted the order had to be cancelled quickly before confusion snowballed.

STEEL: Output of Ingots, Castings Rise in March

As Reported to the American Iron & Steel Institute

	Openhearth		Bessemer		Electric		Total			No.
1951	Net Tons	Pct Cap.	Net Tons	Pct Cap.	Net Tons	Pct Cap.	Net Tons	Pct Cap.	Calculated Net Tons Weekly	Weeks in Month
January	7,844,982	101.4	431,725	90.4	566,460	88.3	8,843,167	99.9	1,996,200	4.43
February	6,935,512	99.3	328,112	75.6	504,077	87.0	7,765,701	97.1	1,941,425	4.00
March	8,059,625	104.2	408,926	85.6	602,504	93.9	9,071,055	102.4	2,047,642	4.43
1st Quarter	22,840,119	101.7	1,166,763	84.2	1,673,041	89.8	25,679,923	99.9	1,996,884	12.86
April	7,857,161	104.9	392,472	84.9	590,888	95.1	8,840,521	103.1	2,060,728	4.29
May	8,071,270	104.3	408,650	85.6	614,579	95.7	9,094,499	102.7	2,052,934	4.43
June	7,667,811	102.3	403,001	87.1	586,148	94.3	8,656,960	100.9	2,017,939	4.29
2nd Quarter	23,596,242	103.9	1,204,123	85.9	1,791,615	95.0	26,591,980	102.2	2,043,965	13.01
1st 6 months	46,436,361	102.8	2,370,886	85.0	3,464,656	92.4	52,271,903	101.1	2,020,561	25.87
July	7,704,433	99.8	411,599	86.4	583,215	87.9	8,679,247	98.2	1,963,631	4.42
August	7,693,322	99.4	436,822	91.5	603,448	94.0	8,733,592	98.6	1,971,465	4.43
September	7,652,167	102.4	404,726	87.7	598,004	96.4	8,654,897	101.2	2,022,172	4.28
3rd Quarter	23,049,922	100.5	1,253,147	88.5	1,784,667	92.8	26,067,736	99.3	1,985,357	13.13
9 months	69,486,283	102.0	3,624,033	86.2	5,229,323	92.5	78,339,639	100.5	2,008,709	39.00
October	8,027,006	103.8	458,128	95.9	631,000	98.3	9,116,134	102.9	2,057,818	4.43
November	7,749,190	103.4	411,954	89.1	632,507	101.8	8,793,651	102.5	2,049,802	4.29
December	7,884,146	102.1	396,831	83.3	604,152	94.3	8,885,129	100.6	2,010,210	4.42
4th Quarter	23,660,342	103.1	1,266,913	89.4	1,867,659	98.1	26,794,914	102.4	2,039,187	13.14
2nd 6 months	46,710,264	101.8	2,520,060	89.0	3,632,326	95.4	52,862,650	100.7	2,012,282	26.27
Total	93,146,625	102.3	4,890,946	87.0	7,096,982	93.9	105,134,553	100.9	2,016,390	52.14
1952										
January[1]	8,103,123	100.7	407,298	89.3	625,696	89.7	9,136,117	99.3	2,062,329	4.43
February[1]	7,703,066	102.4	382,712	89.8	571,432	87.6	8,657,210	100.7	2,091,114	4.14
March[2]	8,386,000	104.2	379,000	83.1	618,000	88.6	9,383,000	102.0	2,118,000	4.43
1st Quarter[2]	24,192,189	102.4	1,169,010	87.4	1,815,128	88.7	27,176,327	100.6	2,090,049	13.00

Note—Percentages of capacity operated in 1951 are calculated on weekly capacities of 1,746,337 net tons openhearth, 107,806 net tons bessemer and 144,891 net tons electric ingots and steel for castings, total 1,999,034 net tons; based on annual capacities as of Jan. 1, 1951 as follows: Openhearth 91,054,020 net tons, bessemer 5,621,000 net tons, electric 7,554,630 net tons, total 104,229,650 net tons. Percentages for 1952 are calculated on weekly capacities of 1,816,837 net tons openhearth, 102,926 net tons bessemer and 157,477 net tons electric ingots and steel for castings, total 2,077,040 net tons; based on annual capacities as of Jan. 1, 1952 as follows: Openhearth 94,973,780 net tons, bessemer 5,381,000 net tons, electric 8,232,890 net tons, total 108,587,670 net tons.

[1] Revised. [2] Preliminary figures, subject to revision.

Industry Controls This Week

Alloys—Amend. 1, SR 42, GCPR emphasizes that specialty alloys, containing tungsten, are included under SR 42.

Machine Tools—M-104 limits finishes which may be used on tools.

Steel—Dir. 10, CMP Reg. 1, emergency shipment ban, revoked.

Tin—Amend., M-8 requires more exact certification of permitted uses of pig tin.

Zinc — Galvanizers are allowed by Amend. 1, SR 76, GCPR to adjust ceiling prices to reflect higher zinc costs.

Latest Government Appointments

Washington has recently announced the following appointments:

Ralph S. Howe, director, Metalworking Equipment Div., NPA;

John H. Martin, deputy administrator, Construction & Resources Expansion, DPA;

Richard W. Rogers, director, Railroad Equipment Div., NPA;

Structurals Price Change Asked

Categories of coverage will have to be defined, Office of Price Stabilization says, before a tailored regulation can be written to cover the needs of the fabricated structural steel shapes, plates, and bars industry.

Currently, producers are pricing under either General Ceiling Price Reg. or Ceiling Price Reg. 30.

Better results could be obtained, says an industry committee, if a specific regulation similar to the construction order (CPR 93) were drawn up, with a base period extending through the last half of 1950 and the first quarter of 1951. During this era the industry was recovering from the depressed

Turn to Page 83

status prevailing in pre-Korean days.

An industry subcommittee will work with pricing officials in determining the basis and coverage of a possible new regulation.

Copper Price Rise Okay Doubtful

Domestic producers of primary copper are unlikely to get any government encouragement on prospects for raising the price of their product.

Metals Branch officials at Office of Price Stabilization, who hope to finish their work on a tailored regulation for the primary metal early in May, are known to be adhering to the use of a dual price basis—24½¢ per lb for domestic copper and 27½¢ for imported.

U. S. producers, however, are in line to get a look at the completed order and an opportunity to make comments on its suitability before the still uncertain date of issue.

Coal Export Shipping Curbs Lifted

Allocations and licensing of coal exports—in effect since last November—have been lifted, effective Apr. 1.

Shortages of shipping and port facilities which made the controls necessary in order to fairly distribute foreign requirements have cleared up, U. S. Office of International Trade says.

Meanwhile, Mutual Security Agency, which has financed about one-fourth of European coal purchases, last week issued a French purchase authorization for $4 million worth of United States coal, of which $500,000 worth goes to North Africa.

Tin Users Must Give More Details

National Production Authority has tightened up on loose interpretations of tin order M-8 by amending it to require more detailed certifications by small users —those who consume 6000 lb a month or less.

Officials said that small users have often interpreted the permissions to mean that the 6000 lb figure is also a ceiling, overlooking the 90 pct limitations and inventory regulation.

Amendment of the order now requires small users to certify that the order will not violate the 60-day inventory ceiling, that its use will not exceed the 90 pct limitation, and that it will be used only for permitted uses.

End users of pig and secondary tin, solder and babbitt are required to specify end uses in the certification. Telephone wire is dropped from the list of products which are permitted 8 pct of tin.

Galvanizers May Show Zinc Rises

Manufacturers of galvanized iron and steel items who have been selling their products under the General Ceiling Price Reg. now may adjust ceiling amounts to reflect higher zinc costs.

These producers are authorized to figure ceilings in accordance with price lists by using a figure of 19½¢ per lb of zinc, or by allowing for an increase of 2¢ per lb of zinc. This 2¢ increase was allowed in prices of slab zinc by government action last Oct. 2.

Producers of galvanized products who were not party to a voluntary agreement between government and industry on cost increases heretofore were unable to reflect higher zinc prices, however.

The new authorization is covered by Amendment 1, Supplementary Reg. 76, GCPR, effective Apr. 14.

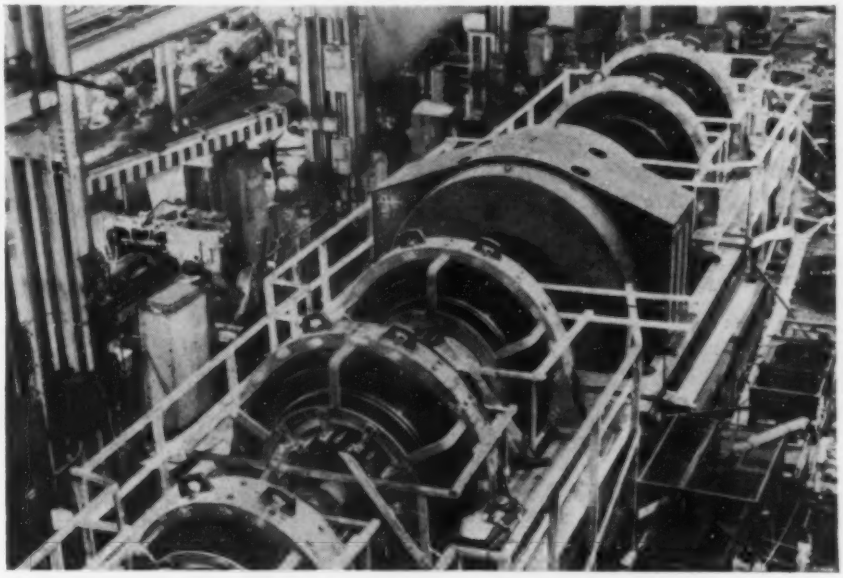
Lifting of Zinc Controls Asked

Rising zinc imports may shortly bring revision of National Production Authority order M-9, lifting all controls except inventory ceilings and directive power to order shipments in hardship cases.

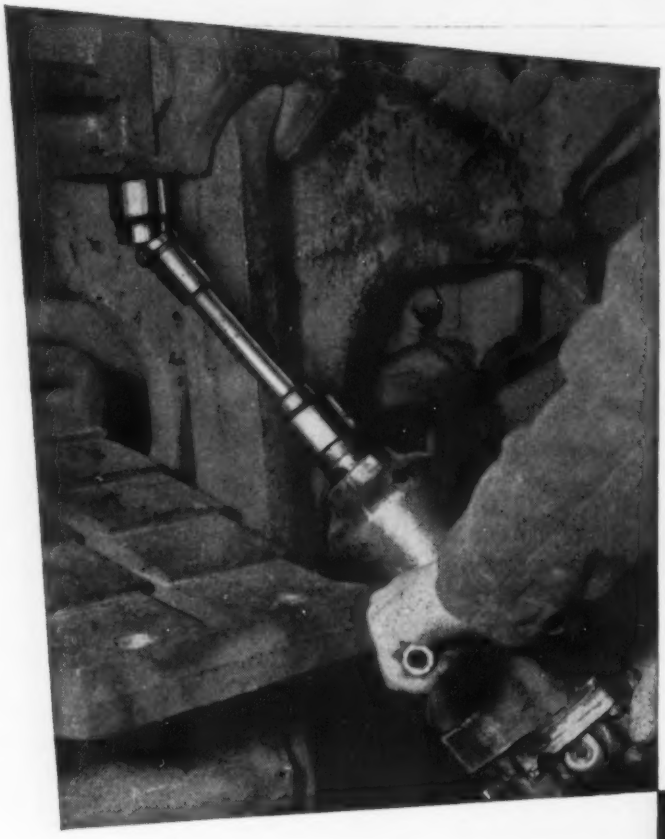
Such action has been endorsed by the zinc producers advisory committee.

Following a meeting last week in Washington, it was revealed that availability has passed the consumption rate. Supplies of primary and secondary zinc are estimated at 969,000 tons against a probable consumption of 933,000 tons.

Increased availability is substantially due to rising imports. This figure has been revised upward from a previous 88,000 tons to a new potential of 115,000 tons.



TESTING: General Electric Co. tests the longest motor generator set it has yet built. Rated at 10,800 kw, the set will power a 4-stand cold strip mill at U. S. Steel's new Fairless Works.



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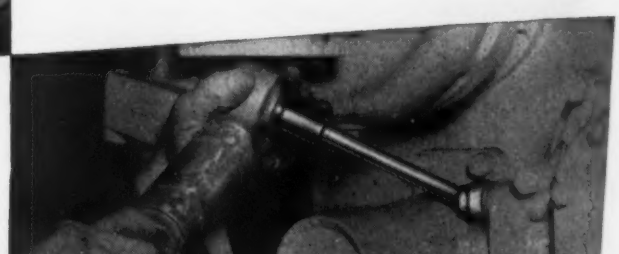

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SQUARE DRIVES: 3/8" 1/2" 5/8" 3/4" 1"

for | HEX NUTS—1/4" to 2 1/8"
SQUARE NUTS—1/4" to 1 1/2"

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Steel Mill Seizure May Boomerang

Justice Dept. lawyers say it's "routine" but Congress says it's getting to be a bad habit . . . May curb White House "authority" . . . Controls extension postponed—*By G. H. Baker.*

Government lawyers, in their attempts to justify President Truman's industry seizure action of last week, are surprised to find some of their own statistics booby-trapped against them.

Justice Dept. soothingly tried to prove last week that seizure was nothing to get excited about. Seizure, they purred, was "just routine," inasmuch as the Federal Government had by actual count taken over industrial property in 70 specific instances since 1941. And some properties, like the coal mines, have been taken over more than once.

Bad Habit—Actually, many congressmen were amazed to learn that plant seizure by the White House is showing disturbing signs of becoming a habit. There's increasing talk of legislating against the "authority" (if it be that) of the White House to seize any industry—or company, for that matter—whose practices are deemed by legislators to be inconsistent with their concept of "public safety."

As Sen. Bridges, R., N. H., puts it: If the President has the power to take over the steel mills because of military demands, he may then logically decide he has the power to seize cattle on the farms or textile mills.

Sen. Taft, R., Ohio, said Mr. Truman should have used the Taft-Hartley Act. "The President has usurped authority which he does not have under the Constitution and the laws—which is not unusual," he stated, adding that Mr. Truman "did the same thing in the case of the Korean war."

Started in 1941—A check shows that the first federal seizure of industrial property came on June 9, 1941, when President Roosevelt issued an executive order instructing the Secretary of War to take over North American Aviation, Inc. Up to last week, all successive seizures were made in the name of specific legislative authorizations. Steel case was the first to be undertaken under the so-called inherent powers of the Constitution.

STEEL SEIZURE . . . Commerce Secretary Sawyer's signature makes it official.

Postponed—Whole future of government controls remains tied up in the mist of obscurity surrounding government operation of the steel mills.

Both Senate and House committee considering the proposed 1-year extension of federal controls over prices, wages, profits, and materials have decided to suspend further action until the fog lifts.

Chairman Maybank, D., D. C., of the Senate Banking Committee, says the Congress would be making "a dreadful mistake" in legislating on controls during seizure. "It wouldn't be fair to the workers, to industry, or the public," he states. And Sen. Capehart, R., Ind., believes the steel seizure tangle has raised the larger question of whether or not controls should be extended at all.

Not Practical?—Scrap between the Capitol and Pentagon over why the military should or should not buy its supplies from a single catalog is pointed up by the Navy's outspoken distaste for unified procurement.

Vice Admiral Charles W. Fox, the Navy's chief supply officer, claims there "has been no real showing" that any substantial sum would be saved by centralized buying.

Fox says he's not opposing single-catalog buying—he just doesn't believe it's practical.

At the Capitol, the House Armed Services Committee is leading the field in demands that the Pentagon unify its 15 supply catalogs.

Limit Fringes — Employers in the construction industry are limited to a 7½¢-per-hr contribution to employee health and welfare plans under stipulations of the new Reg. 2, issued by the Construction Industry Stabilization Commission.

This ceiling on employer contributions is the chief difference between Reg. 2 and Wage Stabilization Board's Reg. 19, which also covers health and welfare programs. Funds labeled for the programs must be committed to purchase of specific benefits.

Limitations on sums to be donated by employers were forecast by WSB in mid-March, when the agency approved a pay policy allowing increases up to 15¢ per hr over the 10 pct catch-up increase formerly allowed.

Long life for HOBS

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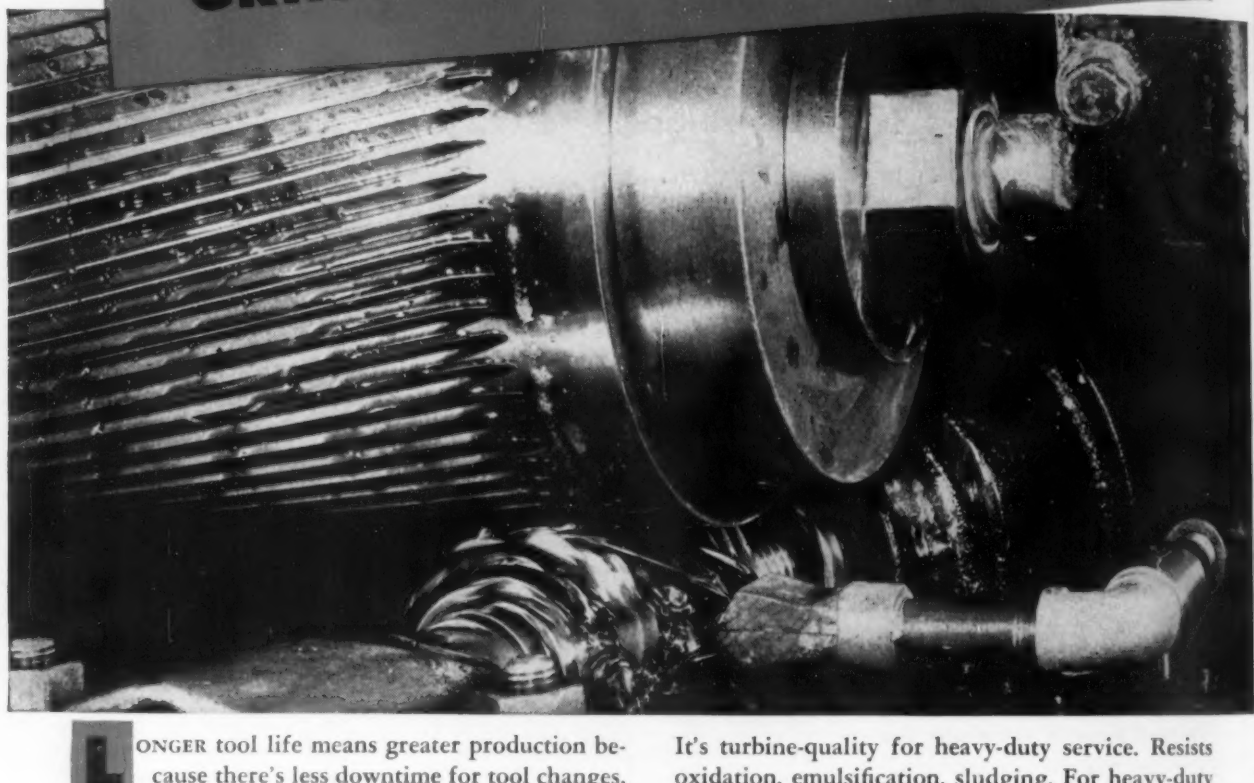

LONGER tool life means greater production because there's less downtime for tool changes. Actual job records from plants in all parts of the country show tool life increases up to 300% when the proper *Texaco Cutting, Grinding or Soluble Oil* is used.

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils*. Thus, whatever the metal or your method of machining, there is a Texaco cutting fluid to help you do it better, faster, and at lower cost. In addition, you'll get better finish, often saving extra operations; and reduce your rejects, thus saving critical material.

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FUEL: Need Haste in Expansion

DSFA fears coal, coke shortage . . . Expansion behind rapid steelmaking growth . . . Steel expansion expected to help boost demands for coke 18 pct above last year's level.

A faster, broader expansion of metallurgical coal and coke production facilities is now being urged by the Defense Solid Fuels Administration.

Coke supplies are seen as continuing to be tight (THE IRON AGE, Mar. 20, 1952, p. 51). And DSFA fears that actual shortages may develop before the steel industry reaches its capacity goal of 120 million ingot tons.

The agency estimates that by the end of this year, rapid expansion of the steel industry will have increased coke demand by 18 pct above production rates of June 1951.

Oven Capacity Lags—Tonnage-wise, this means an increased demand for 13 million tons of additional production above the 1951 figure. About 120 million tons of metallurgical coal will be required—an increase of 17 million tons.

Oven capacity has not kept pace with other expansion. Actually, it was losing ground prior to 1951. Net production as of June 1951 was 72 million tons compared with 73.7 million in 1949.

For example, during 1950 about 552 new slot-type ovens were placed in production. But during the same period, 571 were closed down. It is estimated that one-half of all slot-type ovens are 20 or more years old.

Expansion Coming—It is estimated by DSFA that new oven capacity of about 15 million tons will be placed in production over the 18 months ending next December. But during the same period, it is likely that 5 million tons will go out of operation, only part of which will be reconstructed.

Some government aid has been extended. Certificates of necessity have been issued for coke and by-product ovens construction involving about $145 million. About $120 million of the amount has been approved for fast tax write-offs.

DPA Seeks Boost in New Well Rate

All-out assistance of the Federal Government is to be thrown behind an attempt by the petroleum industry to sink new oil wells at an all-time record rate over the next couple of years.

Sights are now set on drilling 80,000 new wells during the 18 months between July 1952 and December 1953.

This means a stepping up of the annual drilling rate from the 50,000 wells already aimed at for 1952 to 55,000 in 1953. Until after Korea, 40,000 a year was considered a good rate.

Refinery Expansion—It also means new refinery expansion sufficient to handle an additional 750,000 bbl a day, of which 500,000 would be constructed next year; an additional 153,000,000 bbl storage capacity, 93,000,000 to be constructed in 1953; and an additional 20,000 miles in pipeline capacity, 12,000 to be scheduled for next year.

These expansion goals have already been submitted by Petroleum Administration for Defense and tentatively approved by Defense Production Administration.

This gives the green light to materials control agencies to look with a generous eye on requests for allocations, priorities and other assistance for any given quarter.

Assuming that the materials will be available, and that the planned expansion goals can be attained, overall capacities will be about as follows:

Refining, 8,000,000 bbl per day; pipeline mileage, about 185,000; and, storage capacity, not counting retail storage, 1,250,000,000 bbl.

"Whom shall I say is waiting to see him in vain?"

Atomic Plant in Ohio Valley?

Atomic Energy Commission continues its survey of potential sites for a new production facility, with concentration on Ohio Valley areas.

The Midwestern region appears to offer what AEC wants in supporting a "gaseous diffusion plant," or uranium separation works. In the Ohio Valley, according to the agency, there is a plentiful power potential "at reasonable cost in quantities needed for construction and operation." There also is an ample water supply.

Some 5000-6000 acres will be required. Plans call for a plant costing about $1 billion, using some 1,800,000 kw of electricity and employing between 4000 and 5000 workers.

AEC says electric generating facilities will be built, either by industry or by the government. The agency adds, it wants to avoid construction of a government-owned-and-operated community.

Construction of the plant will be part of the new atomic-energy expansion program announced by the Administration in January.

Industrial Briefs

Press Data—A 52-page revised issue of *Computations for Metalworking in Presses* has just been issued by E. W. BLISS CO., Canton, Ohio. The compilation of engineering data broadens work first printed 2 years ago. Included are data to compute pressure capacity and sustained work capacity of various mechanical and hydraulic presses. Copies on request.

Steelmaking Capacities — At the beginning of the second quarter the capacity of steelmaking furnaces in the U. S. was estimated at 109,218,670 net tons per year, on the basis of a previously scheduled increase of 631,000 tons in the first quarter. In the second quarter the scheduled addition to capacity is 2,919,600 tons, with 3,214,300 planned for the third quarter and 1,688,800 tons for the fourth quarter. In 1952 the total increase in annual capacity is scheduled at 8,453,700 tons, making planned capacity at the beginning of '53, 117,041,370 tons.

New Location—R. L. SCHMITT CO. has moved from Wyandotte to 6536 Roosevelt, Allen Park, Mich. Schmitt Co. specializes in solid carbide tools and mills, center laps, grinding tools, reamers, midget burrs, rotary files, standards and specials. A new 16-page catalog is available.

High Pressure Boiler—RUST ENGINEERING CO., Pittsburgh, will install a new high pressure boiler for Weirton Steel Co., Weirton, W. Va. The new unit, designed for a steam capacity of 350,000 lb per hr, will be equipped to burn blast furnace gas primarily with provisions for firing with pulverized fuel and coke oven gas as well. Rust has also begun work on a blower house and auxiliary equipment for a turbo-blower for Weirton's new No. 4 blast furnace.

New Name—K. H. P. Milwaukee Steel Co., Milwaukee, has changed its name to KORHUMEL STEEL & ALUMINUM CORP. OF WISCONSIN.

New Representative—Heat & Control, Inc., San Francisco, has been appointed West Coast representative for BLOOM ENGINEERING CO., INC., Pittsburgh, to handle Bloom's line of fuel burners and combustion equipment.

Yankee Contributions—New England will be hailed as the center of world research in a celebration in Boston, Apr. 18, with scientists and industrialists from the 6-state area participating in a 2-day conference. The panels for Research Day will be conducted in four major areas of discussion: fibers, chemicals, electronics, and metals. Program has developed as the result of a national survey of research tools and facilities conducted by the special Research Day committee headed by William M. Rand, former head of the Monsanto Chemical Co., St. Louis.

High Temperature Metallurgy—A series of five lectures directed toward the promotion of a better understanding of theoretical and practical aspects of the behavior of metals at high temperatures is being given by the Detroit Chapter, AMERICAN SOCIETY OF METALS. Lectures are on the general subject, "High Temperature Metallurgy as Applied to Jet Engines." First two will be given by Dr. J. W. Freeman, associate professor at the University of Michigan.

Official Change — Texas Engineering & Mfg. Co., Inc., Dallas, has changed its name officially to TEMCO AIRCRAFT CORP. Stockholders have voted to increase the authorized capital stock of the corporation from 895,760 shares of $1 par value to 1,300,000 shares.

"He's used to open pit mines."

Parker Valve Lines — REPUBLIC MFG. CO., Cleveland, is offering a new 40-page 2-color catalog of needle, globe, ball check, relief, and plug valves formerly manufactured by the Parker Appliance Co. The valves, ranging in size from ⅛ in. to 1 in., are made in brass, aluminum alloy, steel, and stainless steel. Requests for catalogs and prices should be sent to Republic at 1930 W. 77th St., Cleveland.

Replace Vises — COLUMBIAN VISE & MFG. CO., Cleveland, has offered to replace free any of its products damaged during the Mississippi Valley storm period. Action duplicates its procedure in previous similar cases of emergency.

Electrical Equipment — WESTINGHOUSE ELECTRIC CORP., Pittsburgh, has been awarded a $278,000 contract for major electrical equipment to be used on a petroleum products pipeline being reconstructed by Tuscarora Oil Co., Ltd., to transport refined oil products across Pennsylvania. The 12-in. line, capable of carrying 56,000 bbl of oil per day, will extend from Allentown to the Ohio River. Delivery is scheduled for late this year.

Expands Facilities — WARD LEONARD ELECTRIC CO., Mt. Vernon, N. Y., has moved its Los Angeles branch office and warehouse to larger headquarters at 1605 E. Olympic Blvd., Los Angeles.

Color Movie—SKINNER CHUCK CO., New Britain, Conn., has released a new educational color movie titled, *Chucks and Their Uses*. New film is of equal interest to apprentices and machine operators, as well as experienced engineers and production men. Scenes include a complete showing of parts, construction, mounting and use of independent, universal scroll, and power chucks. Film is available for showing without charge to qualified schools and engineering groups.

New Warehouse — ZIV STEEL & WIRE CO., Chicago, has opened a new tool steel warehouse at 1053 Custer Drive, Toledo. The new branch will stock a complete line of tool and die steels. William P. Stead is manager.

BUSINESS IN MOTION

To our Colleagues in American Business . . .

Revere began to make aluminum extruded shapes in 1922, and hence has had thirty years of experience with the metal. During those years it has gained invaluable experience, and has installed new equipment in order to expand the list of aluminum mill products it offers to industry. This expansion has been conducted at an accelerated pace during the past ten years. Today it may come as a surprise to some people that Revere's present installed capacity makes it the largest independent fabricator of aluminum in the United States.

Revere is sometimes asked why we should have sought the same position in aluminum alloys that we occupy in copper and copper-base alloys. The fundamental reason is a simple one: we wished to increase our service to industry, which is demanding more and more metals of every kind. Thirty years ago we recognized the growing importance of aluminum, and we also perceived that aluminum and copper are in many ways complementary metals. Being able to offer both means that Revere can be impartial in recommending the one most certain to give the best results in a given application.

So successful has been our experience with aluminum that we are now pursuing a comprehensive program of expansion in regard to it. In one of the Revere plants in Baltimore, new aluminum rolling mills and annealing furnaces were installed before Korea, making possible tripled production of coiled sheet. Right now, in another Revere Baltimore plant, new extrusion presses and draw benches are being put in place. Equipment for the production of aluminum coiled sheet was installed in our Detroit plant over a year and a half ago. In about a year, the Los Angeles mill, now working with copper and copper-base alloys only, should begin to produce aluminum tube and extruded shapes in both the heat-treated and non-heat-treated alloys.

These plans to increase materially the Revere output of aluminum mill products will make them more quickly and easily available in various industrial centers. Here is evidence of our belief that the future of aluminum is as great as that of copper. Each has its place, in peace as well as war.

Revere's thirty-year growth in aluminum is in the American tradition of freedom to seek new ways to serve customers. It is typical of the business world, for in many thousands of companies the original products or lines have been expanded to include more or less related items. So we suggest that no matter what you buy, you ask your suppliers if they have other materials or products that would be of value to you. The more you know about what your suppliers make, the greater the possibility of improving your products or productivity.

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Detroit Sets Sights On Sales

Automakers turn attention to moving increased output . . . Stocks still low from cutbacks, but the future worries carbuilders . . . This year's sales stay low — *By R. D. Raddant.*

Automobile builders shrugged off the steel strike crisis as if it had not occurred, set their sights on the year's highest production figure for April, and turned their attention toward the car market.

It's not that they haven't realized that the market demanded attention, but the strict cutbacks earlier in the year combined with the threatened steel strike made the volume of sales academic. Even the slow sales of the winter months resulted in depleted stocks because of enforced low production.

But now that the industry seems assured of building 5 million units this year, the problem of selling them becomes more important. Stocks are so low that any kind of a spring boom will create a short-time scarcity, but it is the long pull that is causing the concern.

Sales in Wayne County, the real home of the automobile industry, show why there is worry about the market. In the first 3 months of 1952, total new car sales were 29,011 compared with 48,125 a year ago. March sales this year were 11,433 against 18,400 for 1951.

Fight Starting—National Production Authority hearings Apr. 29 on Ford's request to revise the production quota base period now loom as a battle between Ford and Chrysler for second place in the automotive industry.

In simple terms, Ford wants the base period, now from 1947 to 1949, extended to include the last half of 1949 and the first half of 1950. This would boost material allotments to the Big Three, seemingly at the expense of the independents.

But while Ford's material allotment would still be behind Chrysler by a few percentage points, it would nevertheless mean that Ford could build a few more total cars than Chrysler. Chrysler looks sourly on this.

"You don't think we are just going to sit by and watch a government order put us out of second place in the industry do you?" was one Chrysler man's reaction.

Automotive Production

(U. S. & Canada Combined)

WEEK ENDING	CARS	TRUCKS	TOTAL
Apr. 12, 1952	97,135*	27,455*	124,590*
Apr. 5, 1952	97,371	28,297	125,668
Apr. 14, 1951	128,757	34,082	162,839
Apr. 7, 1951	125,912	32,164	158,076

*Estimated

Source: *Ward's Reports*

The independents, which have more than a position at stake, will also join in opposing Ford to fight against their production being slashed to provide more for the Big Three.

Chic—European styling in automobile bodies appears to be gaining more ground. Packard is the latest to show more than curiosity in the rakish body designs that are coming out of Europe, particularly from Italy.

Two top Packard engineers, W. H. Graves, vice-president in charge of engineering, and Edward Macauley, chief engineer, leave Apr. 18 for Europe with the frankly admitted purpose of discussing with Italian designers the possibilities of extending "European feelings" into future production models.

"Many have complimented the new Packard for having a certain European flair, and we feel that further investigation in Europe is desirable as background for projected models," Graves said. Preliminary meetings with Italian designers now in this country already have been underway, he said.

Magnesium—High cost of magnesium prevents it from appearing in any great extent in the auto production picture, but its light weight brings it into the production scene in related ways.

One new magnesium development is a light weight chassis frame checker used by Oldsmobile and Cadillac to inspect each frame as it comes down the assembly line to be sure that the body is perfectly level when it is placed down on the frame.

Close tolerances are required to assure perfect alignment of the body with the frame to prevent any warping of the body which would result in sticking doors, body noises, or other difficulties that might be caused by misalignment. The checker, which conforms to the level position the body should take, is lowered to the frame and alert inspectors check the fit and correct differences with rubber and steel shims.

The value of magnesium is in its weight, 270 lb compared with a steel fabricated unit it replaced at Oldsmobile which weighed 2500 lb. Frame was manufactured by Magline, Inc., Pinconning, Mich.

New Engine—There are good indications that Chevrolet is making

definite plans to go into production of a V-8 engine. While no actual orders for tooling have been reported, discussion has apparently reached a stage where the GM finance committee will soon be called upon to make a decision on tooling plans. Apparently, the new Chevrolet engine design has been virtually frozen. The earliest possible date for a new V-type Chevrolet engine is 1954.

New Tube Mills Revealed by Ford

Two steel tube processing operations which are producing 180 ft of tubing a minute were disclosed by the Ford Motor Co. The mills, located at the Mound Road plant north of Detroit, are designed for quick conversion to defense production of welded tubing up to 5 in. diam.

One mill is 400 ft long and turns out tubing for axle housings at a rate of 75 ft per min. The other, 175 ft in length, is producing 105 ft of tubing per min. for driveshaft assemblies.

Process begins with the automatic unwinding of coiled steel from huge drums with steel stock entering the loading end of the mill to be gradually formed into tubular shape by a series of parallel rollers. Tube is automatically welded and flash removed.

UAW Works on Annual Wage Plan

United Automobile Workers (CIO) have now disclosed some of the details of the long promised, or threatened, annual wage plan that industry will receive next fall.

It is expected to follow the lines of the United Steel Workers' plan with auto companies asked to guarantee at least 75 pct of the salary employees would take home if they worked all year long.

"A committee is now at work on it and will report early next fall," declared UAW's Walter P. Reuther.

All of the union's contracts with major auto companies, based on escalator clauses, have until 1955 before they expire.

Tractors:

Ford settles patent-right suit with Ferguson for $9,250,000.

Ford Motor Co., which once built tractors under an oral agreement between Harry Ferguson, tractor inventor, and the late Henry Ford, paid Mr. Ferguson $9,250,000 in a consent judgment for alleged patent infringements.

The payment by Ford ended four years of litigation in which Mr. Ferguson sought $342 million and two Ferguson tractor distributors $21 million from Ford and Dearborn Motors, the national marketing agency for Ford-made tractors.

Settlement represents past royalties on Ferguson tractor patents dating back to July 1, 1947. It marked the first time that Ford yielded to a major patent suit.

Not Happy—Although both companies appeared glad to have the suit settled, it was not a friendly agreement.

"In normal times Ford Motor Co. would carry such a suit to a final conclusion in the courts," declared Henry Ford II. "These are not normal times. Under the circumstances we are glad to get rid of the litigation."

Under the terms of the consent judgment signed by Federal District Judge Gregory Noonan in New York, Ford will change operation and control systems in a pump used on the tractor. The tractor will continue to use hydraulic control and its present method of attaching and operating implements.

During the court fight attorneys took 80,000 pages of depositions, studied 1 million documents.

GM Gets New Ordnance Contract

GM's Truck and Coach Div. has been awarded a $125 million ordnance contract to build tactical military vehicles for Army Ordnance. New contract brings GM Truck's total dollar value of defense contracts to more than $500 million.

THE BULL OF THE WOODS — By J. R. Williams

BOY, YOU CAN LIVE TOO LONG AN' NOT BE VERY OLD EITHER!
YES, IN TH' NOT SO DISTANT PAST THEY USED TO LEAVE ENOUGH ON A FORGIN' FOR A MACHINIST TO GET A LOT OF SLEEP ON ONE O' THEM!
CASTINGS ARE GETTIN' TH' SAME AS FORGIN'S -- WE'RE GETTIN' TO BE NOTHIN' BUT POLISHERS NOW!
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WORLD'S LARGEST, MOST COMPLETE LINE

Strike Costs 28,000 Ingot Tons

West loses about 24 pct of steel capacity rate in wage dispute . . . Biggest producers have biggest losses . . . Others sign or keep talks going . . . Normal operations expected this week.

Western steel users were deprived of about 28,000 ingot tons of steel last week because of the strike threat. This is about 24 pct of what would have been produced had things been normal.

Principal losses were sustained by the three major producers—U. S. Steel's Columbia-Geneva Div.; Bethlehem Pacific, and Colorado Fuel & Iron Corp. Independents were unaffected either because they had settled with the union or were continuing operations while negotiations proceeded. Ingot production was expected to reach 100 pct of capacity this week.

Bad Break—Greatest loss in finished steel production as an indirect result of the strike threat will come from failure of the 500,000-hp electric motor which drives the slabbing mill at the Geneva, Utah, plant of U. S. Steel.

When an effort was made to start this key power unit last Friday it immediately failed with "extreme damage" reported. Both rotor and stator will probably have to be replaced and General Electric specialists were flown to the plant. Best guess is the slabbing mill will be down for at least 10 days.

Short Supply—Production-wise this means no slabs can be produced for that period. Only 4 days' supply of slabs are on hand. Cold reduction production at the Pittsburg, Calif., plant of Columbia will probably be curtailed after its 10-day inventory of coils from Geneva is exhausted.

Cause of the failure of the $250,000 motor hadn't been determined late last week, and no estimate of repair costs had been made.

New Tube Plant—A start was made last week on construction of what will be the West's first oil field tubing plant.

Western Tube Co., headed by G. C. Hoyt, retired International Harvester vice-president, broke ground for a $16 million plant at Dominguez (15 miles south of Los Angeles) last week and announced it will build a 500,000-sq ft plant to produce 100,000 tons of oil field tubing, casing and drill pipe per year.

Two 17-ft Electromelt furnaces will produce the basic steel from scrap to supply a 2-stand, 2-high Bliss bar and billet mill. Production is expected within 18 months according to Mr. Hoyt. Executive offices of Western Tube are to be established at Whittier, Calif.

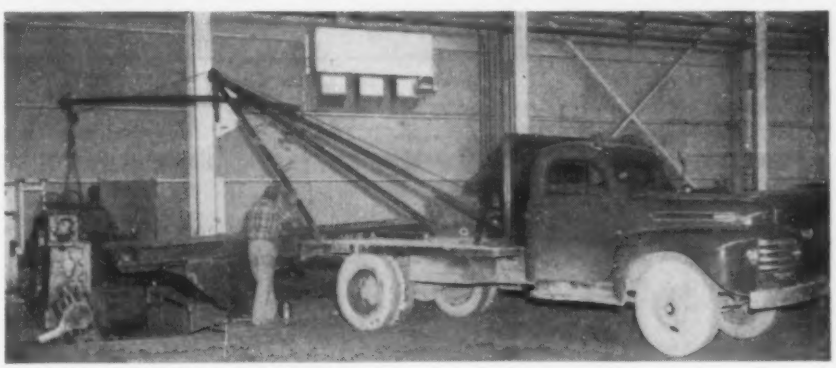
White Glove Inspection—Western steel mills long accustomed to taking any steel scrap they could get are becoming increasingly choosy in their buying since the market has eased considerably. One leading steel producer is now requiring balers to identify shipments with a mark and all are subject to rejection after opening.

A price break of about $5 a ton for bales is expected within the next few weeks as smaller dealers are forced to sell and larger ones find storage facilities strained.

Movement of cupola cast was practically non-existent although isolated sales at above going prices were reported on contract deals. Foundries, too, are finicky and demand only the cleanest motor blocks—some even greaseless.

Shipbreaking — Scrapping of wartime cargo and troopships continues to help charge furnaces for new production. The *U.S.S. Wharton*, a 4500-troop vessel, will be broken up by Learner Co. in Seattle and result in about 15,000 tons of scrap. This firm last year scrapped five LSTs and is planning to get more Victory ships this year.

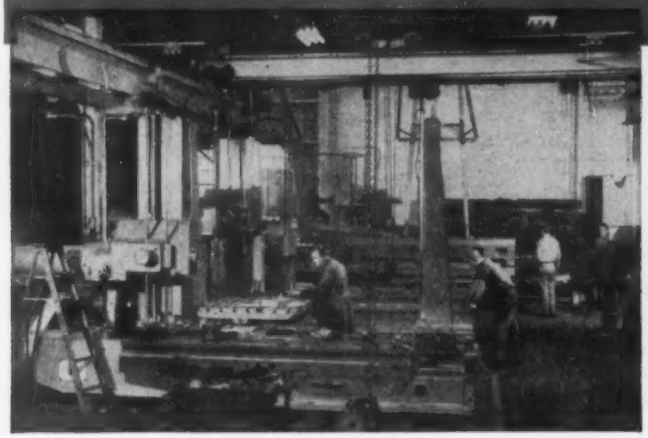
A much older veteran, the Army-Navy transport *Republic*, left Olympia, Wash., last week under tow for the East where she will be scrapped by Bethlehem Steel. Built in Belfast in 1907, she was captured by the Allies in World War I and used again in World War II. Bethlehem purchased the ship for $511,000.



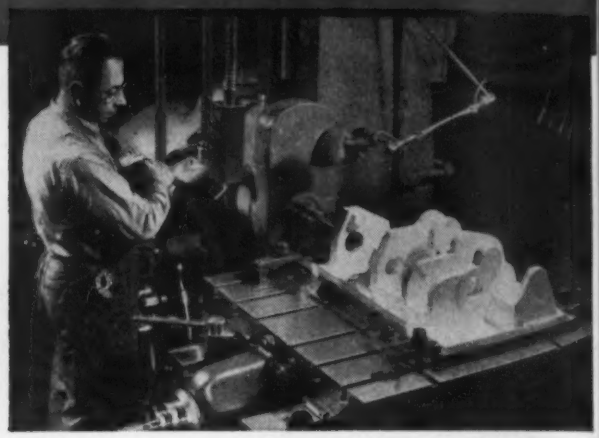
WHERE THERE'S A WILL: Since the overhead crane for Geneva Steel's new sheet mill building hadn't yet been delivered, contractor F. H. McGraw & Co. had to find another way to move heavy equipment into place. Equipment was hauled into building on cars and skidded off or lifted by winch on A-frame truck. Photo shows placing of base plate near shearing line.

52 YEARS OF SPECIALIZATION

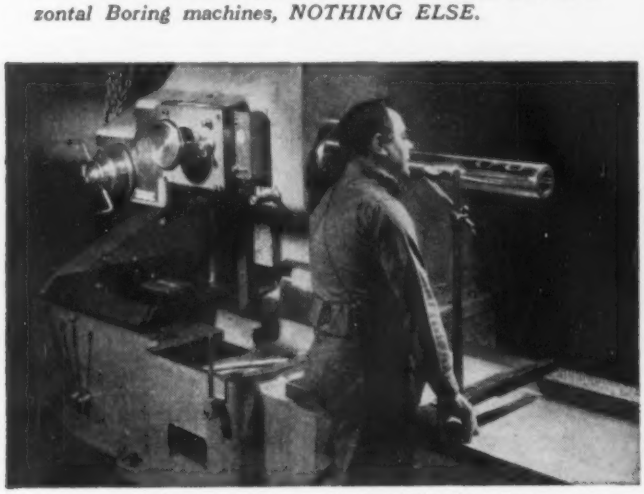
PAY DIVIDENDS IN THE DEFENSE EFFORT



Our plant is operating at peak capacity producing horizontal Boring machines, NOTHING ELSE.

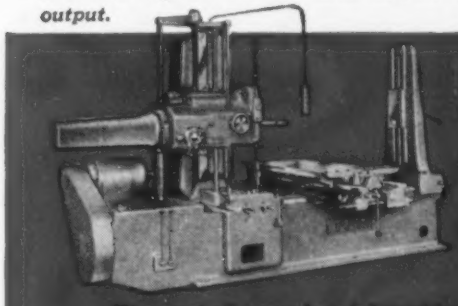


In addition, many outside suppliers are helping us around the clock (using many a Lucas purchased from us in years past).



Because of half a century of specialization Lucas men maintain high Lucas standards despite vastly increased output.

More shipments than ever, but, of course, defense priorities dictate who gets what. Perhaps this is the machine we originally scheduled for you.



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Backlogs Determine Delivery Need

New order and urgency list ready to help builders distribute machine tools to military services . . . System is modification of World War II plan . . . Urged months ago—*By G. Elwers.*

A master urgency list and a new machine tool distribution plan were about ready, as of Monday, for distribution to machine tool builders. Both developments have been eagerly awaited by machine tool builders.

They are expected to greatly simplify the scheduling and shipping of machine tools according to the greatest need as indicated by military production schedules.

Similar to E-1-b—The new system for allocating output of machine tools closely resembles the E-1-b system used in the latter months of World War II. It will probably be issued as a revision of M-41, the current order regulating machine tool deliveries.

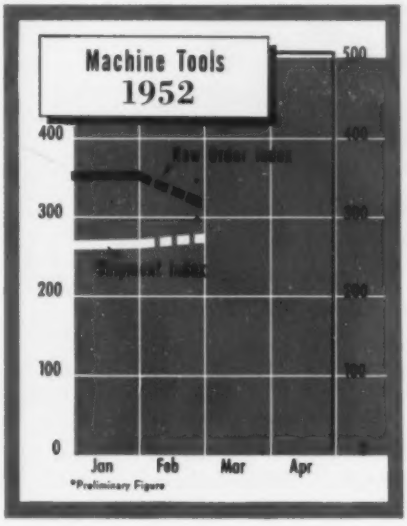
Under M-41 each month's output of each type of machine tool was divided among the different military service groups according to percentage figures set by the NPA. Under the new plan, each builder will divide up his own output each month according to the relative size of each service group's backlog on his own order books.

Smooth Distribution—The new plan is expected to encourage even distribution of military orders, and reduce the need for special orders diverting an individual machine from its scheduled purchaser to one who needs it more urgently.

The urgency list, which will be classified "Restricted," is actually seven lists, indicating in order of urgency each month the projects of the seven different military groups such as Air Force, Navy Bureau of Ships, Navy Bureau of Ordnance, and Army Ordnance.

It will be revised as often as necessary, probably monthly at first, then quarterly later on.

Finally Granted—The machine tool industry has been advocating use of these aids to scheduling of



their output for months. In fact, readoption of E-1-b was recommended to Munitions Board representatives as far back as October, 1950.

Washington sources contend that it hasn't been possible to make these revisions to M-41 before now. For one thing they had a hard time getting the military to come up with a usable urgency list. They had had another fight to get parts of it given a low enough security classification so that it could be distributed.

And, they say, the new method of allocating output would have been a mess if issued before most of the water had been squeezed out of order backlogs. To institute it earlier would have given an advantage to the service groups who had had the most money available and had placed the most duplicate orders.

Conservation Move — Another long-awaited order has been issued, to restrict the finish applied to machine tools. It restricts use of primer, filler, and number of finish coats. The same action was taken during World War II, to conserve materials and manpower.

Costs Fly High—How much has the cost of building machine tools risen over the years? Monarch Machine Tool Co. has a demonstration of the answer. Monarch recently completed a 600-car parking lot behind its plant in Sydney, Ohio.

The parking lot cost more than the entire original capitalization of the company in 1909!

New Master—The departure of Charles E. Wilson as head of the Office of Defense Mobilization may result in the proposed machine tool commission being set up under the Secretary of Defense instead of in the ODM or NPA.

Likewise, the question of who will accumulate and administer the proposed reserve of machine tools for defense is still up in the air. It may go under the Dept. of Defense, or under the General Service Administration.

Persistent — Rumors persist in Washington and elsewhere that not all government-owned reserves of machine tools have been uncovered.

The Central Inventory Group is supposed to have listings of all of them. But many believe the services have held some back. The services deny this, but the rumors continue.

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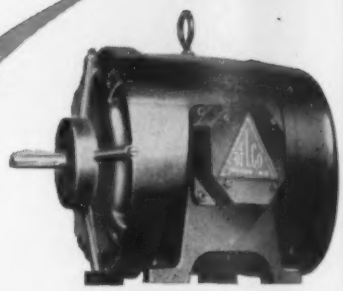
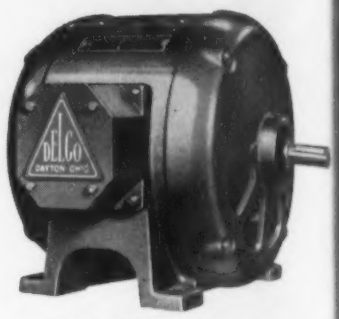
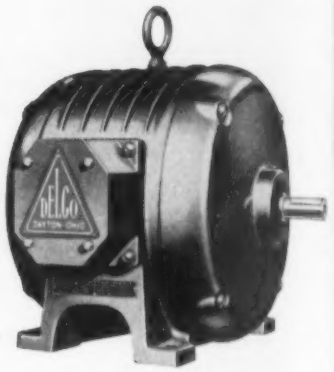


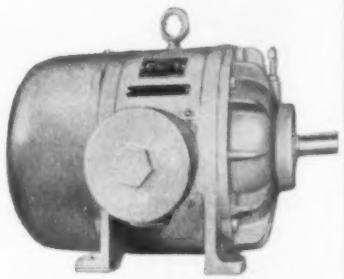
TOTALLY ENCLOSED FAN-COOLED MOTOR



OPEN BALL-BEARING MOTOR



TOTALLY ENCLOSED MOTOR



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The Iron Age

SALUTES

James T. Duffy, Jr.

A former track star has built a career on sound administrative ability . . . Hobbies: golf, fishing.

JIM DUFFY used to be a track star. He learned how to take the hurdles and he's been taking them ever since. The president of Riverside Metal Co. has built a career as a successful management executive and industrialist. He knows the metalworking industries with a thoroughness that comes only from intimate personal experience.

Failing family finances were Jim's first hurdle. After 10 plush, tutored years the family was broke. At thirteen Jim was working summers in a foundry to help out. The family scraped together enough money for a year at Gettysburg college and from there he was on his own.

A Dartmouth scout spotted him doing track work. Jim accepted a scholarship and wound up with a degree in chemical engineering. He earned a Navy commission and served at sea.

Industrial engineers after World War I were scratching the surface of production "systems." Jim's first postwar job was with Ingersoll-Rand where the Gant system was being installed. Jim learned the system thoroughly and with it built a reputation for administrative ability.

Jim likes the challenge of new and difficult tasks. From I-R he went to Thompson Products and in seven years he became general superintendent. Later he became president of Read Machinery Co. He founded Colonial Castings Co. In 1949 he was made president of Riverside.

Hanging in the conference room at Riverside is a 95-lb marlin. Jim, an enthusiastic deep sea fisherman, landed this one after a two and a half hour struggle with no harness. He's an enthusiastic golfer and horseman.

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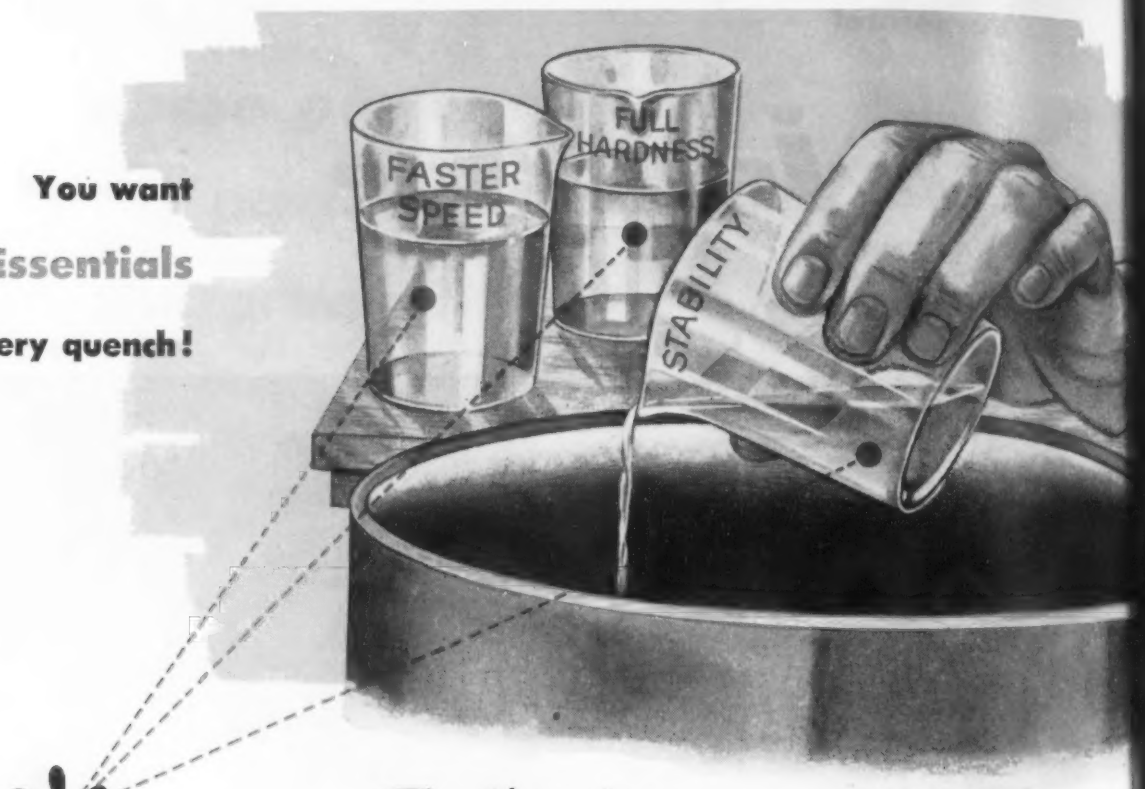

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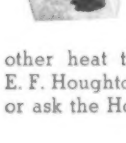

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The Iron Age

INTRODUCES

Paul Donham, elected to the newly created position of executive vice-president and general manager, SHELDRICK MFG. CO., Upper Sandusky, Ohio, and **C. A. Kruse**, promoted from master mechanic to works manager.

Joseph Smith, formerly sales manager, appointed vice-president in charge of production, WELDIT, INC., Detroit.

Edward Lee Soule, Jr., elected vice-president and general manager, SOULE STEEL CO., San Francisco.

Mathew J. Ludwig, appointed vice-president and controller, and **Theodore Thomas**, appointed assistant controller, BASIC REFRACTORIES, INC., Cleveland. **William A. Melville**, succeeds Mr. Ludwig as secretary.

George W. Bulmer, appointed manager of sales, Merchant Trade Products, and **Robert J. Kay**, appointed assistant manager of sales, NORTHWESTERN STEEL & WIRE CO., Sterling, Ill.

Robert C. Colyer, appointed manager, Elbeeco, Inc., a subsidiary of AEROQUIP CORP., Jackson, Mich. **James Crowley** and **Don Mortlock** succeed Mr. Colyer as assistant purchasing agents.

William H. Steinkamp, appointed sales manager, industrial division, MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis.

W. J. Cleary, Jr., named manager of stainless sales, and **W. H. Adamson**, named manager of carbon sales, McLOUTH STEEL CORP., Detroit.

A. J. Harris, appointed manager, Commercial Research, PITTSBURGH STEEL CO., Pittsburgh.

C. C. Smith, formerly general sales manager, tape division, named general manager, cellophane tape division; **William E. Zimmerman**, named general manager, industrial tapes division; and **Bernard W. Lueck**, named general manager, masking tapes division, MINNESOTA MINING & MFG. CO., St. Paul.

Robert J. Baumann, appointed sales manager of silicone products, GENERAL ELECTRIC CO., Pittsfield, Mass. Mr. Baumann will have headquarters at Waterford, N. Y.

Harold F. Holtz, named sales manager, Boiler Div., CLEAVER-BROOKS CO., Milwaukee. He succeeds R. J. Tutsch, who has resigned.

L. R. Hills, appointed district sales manager, New York Metropolitan area, E. W. BLISS CO., Canton, Ohio.

S. Allen Oviatt, appointed manager of sales engineering, Kentanium products, KENNAMETAL INC., Latrobe, Pa. He will have headquarters in the home office.

Vernon L. Johnson, named regional sales manager, Northeastern region, CLARK EQUIPMENT CO., Battle Creek, Mich. He will have headquarters in New York.

A. Richard Boyd, named Atlanta branch manager; **W. J. Ervin**, named Indianapolis branch manager; **W. C. Kunkelman**, named Cincinnati branch manager; **H. M. Rittger**, named St. Louis branch manager; and **R. P. Uhl**, named Dayton branch manager, CARPENTER STEEL CO., Reading, Pa.

Phillip Gomez, Jr., appointed manager of sales; **Arnold Dunn**, appointed manufacturing engineer; **James M. Clark**, appointed manager of finance;

W. E. MASSEY, formerly vice-president and sales manager, elected president, Weldit, Inc., Detroit.

LORING S. BROCK, appointed district vice-president, Intermountain Sales district, Columbia-Geneva Steel Div., U. S. Steel Co., San Francisco.

C. N. REES, promoted to vice-president in charge of manufacturing, Standard Steel Corp., Los Angeles.

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2000 H.P. Slip Ring Motor

General Electric, 3 phase, 60 cycle
2200 V. 236 RPM. Type MT-30-2000-240
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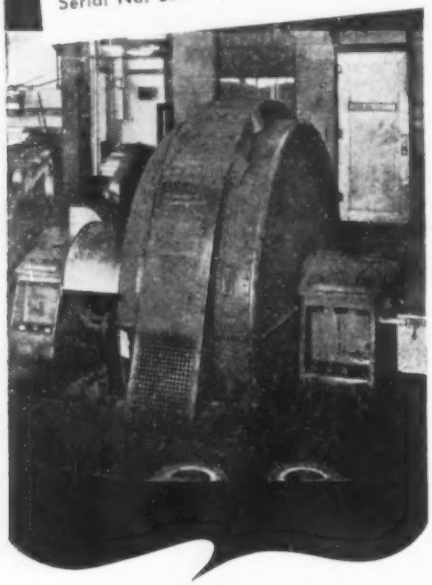

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Personnel

Continued

Alden L. Thomas, appointed superintendent, Morrison plant; **Thomas J. Kelly**, appointed design engineer; and **James H. McDuffie**, appointed supervisor of personnel, newly created Appliance Control Dept., GENERAL ELECTRIC CO., Schenectady.

Robert V. Merrick, appointed assistant sales manager, Region No. 4, WILLYS - OVERLAND MOTORS, INC., Toledo. He will have headquarters in Kansas City.

Paul H. Bjurberg, appointed superintendent, Electric Furnace Dept., Midland Works, CRUCIBLE STEEL CO. OF AMERICA, Pittsburgh.

Gene D. Coldiron, appointed assistant sales manager, Wedgewood Div., RHEEM MFG. CO., Newark, N. J.

Raymond Van Sickles, appointed assistant to the superintendent, Waterbury Div., PLUME & ATWOOD MFG. CO., Waterbury, Conn.

Emery Johnston, appointed sales representative, Pomona Valley and downtown Los Angeles industrial area, and **John V. Buckley**, appointed sales representative, Oakland Div., and metropolitan San Francisco area, ZIEGLER STEEL SERVICE CO., Los Angeles.

Edward L. Fish and **Robert B. Crawford**, named national sales representatives, Drill Bit & Tool Div., Midland, Pa., MACKINTOSH-HEMPHILL CO., Pittsburgh.

P. H. Forbes, elected comptroller, and **R. J. Cantwell, N. K. Feldman** and **R. D. Wing**, appointed assistant comptrollers, BABCOCK & WILCOX CO., New York.

Lawrence M. Limbach, appointed works manager, RYAN AERONAUTICAL CO., San Diego, Calif.

William C. Schneider, appointed sales representative, SELAS CORP. OF AMERICA, Philadelphia. His territory will include central and western New York state.

M. A. Simpson, appointed factory manager, Granite City, Ill. plant, NESCO, INC., Chicago.

Harry Ankeney, appointed works manager, Chicago plant, VERSON ALLSTEEL PRESS CO., Chicago.

C. E. RILEY, appointed general sales manager, McLouth Steel Corp., Detroit.

JEROME F. FERDINAND, elected vice-president in charge of sales, Wales-Strippit Corp., North Tonawanda, N. Y.

WILLIAM E. MILLER, appointed manager, Steel Mill Section, Industrial Engineering Dept., General Electric Co., Schenectady.

JOHN E. NEWLIN, JR., appointed sales manager, steel division, Henry Disston & Sons, Inc., Philadelphia.

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Shown are two examples of W. E. Christopherson's better packaging method which won the Irving J. Stoller Special Award at the 1951 SIMPMHE Convention.

Weight, shipping charges reduced 19%... materials, labor costs, 72%

Strapped pallets answered a packaging puzzle that confronted W. E. Christopherson, Supervisor of Packaging and Crating, Douglas Aircraft Company, Santa Monica, California.

Fire prevention kits for aircraft, valued at $4,748.00 each, formerly were packaged in four-carton units. These were repacked in a heavy wooden box and Signode steel strapping applied. Weight and packaging costs were too high.

Mr. Christopherson had a new idea. Components of each kit were put directly into the cartons—all 4,430 pieces—already inspected and packaged. Now, each kit of 4 cartons was stacked on a sturdy, disposable pallet, bound together in a single unit with Signode steel strapping.

Saves weight, time, money

Weight dropped 73 pounds! Labor and material costs per unit dropped $11.83! Total savings per box shipped by freight were $21.16 per unit! 605 kits were shipped by the new method of packaging. At savings per kit of $21.16, total savings amounted to $12,801.80!

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If you want to know how improved methods of palletizing can cut your packaging, handling and shipping costs, ask to have an experienced Signode field man call on you. Signode perfected many of the most widely used palletizing methods.

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Personnel

Continued

Alex Reikes, appointed manager, San Francisco Branch, GRATON & KNIGHT CO., Worcester. Mr. Reikes succeeds **John N. Daniels,** who has retired.

Hal W. Poole, named manager of engineering, newly created Industry Control Dept., GENERAL ELECTRIC CO., Schenectady.

Earl D. Dresbach, appointed factory representative, Webber Industrial Freezer Div., WEBBER APPLIANCE CO., INC., Indianapolis.

John E. Spears, formerly control manager, Gas & Coke Div., KOPPERS CO., INC., Pittsburgh, named assistant general manager of that division.

Haskell J. Ross, named chief metallurgist and assistant to general manager, R. D. WERNER CO., INC., Greenville, Pa.

OBITUARIES

Maynard O. Halliwill, 45, employment manager, Cleveland Pneumatic Tool Co., Cleveland.

Foster L. Fralick, vice-president, Koestlin Tool & Die Co., and president, Automotive Tool & Die Mfgrs. Assn., Detroit.

Michael F. Lane, 67, founder Lane-Stewart Co., and Acme Lane Co., Chicago.

Dr. Lewis W. Chubb, 69, director emeritus, Westinghouse Research Laboratories, and nationally known leader in the field of science.

Rt. Hon. Sir Andrew Duncan, G.B.E., 67, independent chairman, British Iron & Steel Federation.

Lucian E. Kinn, president, Seneca Wire & Mfg. Co., Fostoria, Ohio.

Francis Mills Turner, 61, vice-president, Reinhold Publishing Corp., New York.

Robert E. Powers, 57, public relations director, B. F. Goodrich Co., Akron, Ohio.

Forrest Nagler, 66, retired manager and chief engineer, Allis-Chalmers Mfg. Co., atomic power section, Milwaukee.

The Iron Age
FOUNDED 1855
Technical Articles

CO_2 cools it—

How To Machine TITANIUM

Here's what you need to know on tool design, speeds, feeds, and coolants for machining titanium. Data is from joint Navy-Westinghouse research, and covers turning, broaching, drilling, tapping, reaming, and milling. Use of carbon dioxide gas as coolant wherever possible is recommended. This is not mere laboratory data, but is based on actual production experience.

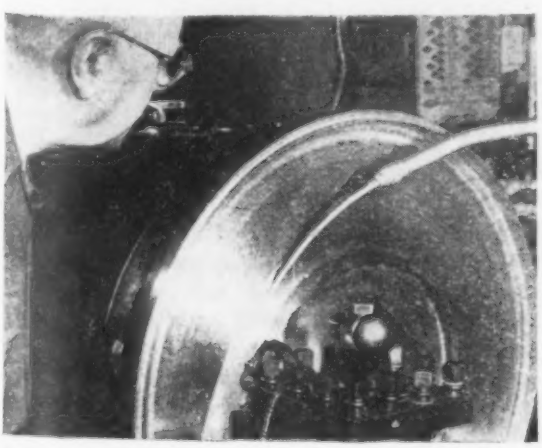
By D. C. Goldberg and W. S. Hazelton

Aviation Gas Turbine Div.
Westinghouse Electric Corp.
Philadelphia

Holding a tolerance of 0.002 in. on the face contour of a titanium disc would have been virtually impossible two years ago. But now an intensive development program carried out by The Navy Bureau of Aeronautics and Westinghouse has given answers to some of the most difficult problems.

Titanium alloy machining is difficult because of three basic characteristics of the material: Extreme abrasiveness of the titanium carbide in the alloy; smearing, or galling, tendency of titanium; and work hardenability.

The abrasive problem has been nearly eliminated with the development of melting practices that hold the carbon content down to about 0.2 pct. The use of abrasion-resistant carbides, cobalt high speed steels, and vanadium-cobalt steels, together with carbon dioxide as a coolant, have greatly alleviated abrasion problems. With even lower carbon alloys, machining is approaching favorable comparison with stainless steels.



TURNING titanium jet engine disc at Westinghouse.

Smearing is characteristic of titanium. When wet, titantium will mark glass. Titanium alloy will adhere to tool steel, high-speed steel, and even carbide to a high degree. This buildup on the cutting edge or smearing on the clearance faces leads to tool breakdown. It can be most effectively combatted by using carbon dioxide gas coolant in conjunction with tools of optimum clearance. Smearing increases if the point of contact becomes hot from friction therefore and a cold stream of CO_2 gas is directed at the tool-workpiece interface. Keeping the tool dry also reduces smearing.

Water soluble coolants, oils, and waxes will also reduce the smearing tendency, but CO_2 has an advantage from the standpoint of recovery of turnings. For example, a finished disc may weigh from 40 to 50 lb, while the forging from which it is machined weighs 200 lb. A large percentage of this removed metal can be recovered and sold for melting stock at premium prices if kept clean and free from oil.

Hardness analysis of the chip and work piece show that titanium is work hardenable only if the tool is dull or if the machine tool or part is not rigid. When a sharply stoned carbide tool is used, the cut surface evidences a 5 to 10 point increase, DPH scale. But when the tool is dull, or the work not rigidly supported, the hardness will increase up to 25 points over the base material.

A typical titanium chip is continuous and curly, but with built-up edges. Hardness measure-

ments of such a chip show an increase of 52 points over the base metal, 321 to 373 DPH average, when CO_2 is used as a coolant. Chip hardness will average 395 DPH with an oil coolant, an increase of 74 points. Obviously work hardenability will increase if the tool becomes dulled by abrasion, or if excessive smearing occurs, so the factors are closely interrelated.

The accompanying tables give the properties of the titanium alloys used in this development work. Data compiled in evaluating carbides and coolants in turning 1¾ in. bar stock have been applied with success to production items such as jet engine compressor discs. This stock was Ti 150A, both low and high carbon. The hard cast iron grade and super hard grades of carbide have been found to produce longest tool life in both continuous and interrupted cutting of titanium. Carbides in the above classes from manufacturers have all proven satisfactory.

The box gives data on turning tool design. The use of a chipbreaker is advisable whenever possible. For increased tool life, the cutting edge of the tool must be stoned.

On high carbon titanium alloy it is necessary to take depths of cuts as heavy as the part and machine tool will allow. In general, the depth of cut will vary from ⅛ to ½ in. On roughing operations, feed is maintained between 0.015 to 0.023 ipr, with an average of 0.018. Satisfactory tool life has been obtained at speeds of 90 to 110 sfpm on the high carbon alloy. This is about 200 cu in. removal to 0.030 in. of land wear.

On the low carbon alloy, the speed can be increased to 150 to 170 sfpm for equivalent tool wear. These data are based on the use of water soluble oil coolants. On finish turning, 0.006 to 0.008 ipr, with 100 to 120 sfpm and 0.030 to 0.060

TOOLS FOR MACHINING TITANIUM

Turning

Material	carbide, cast iron or super hard grades
Side rake	3 to 7°
Back rake	0°
Side cutting edge angle	0°
End cutting edge angle	6°
Relief	6°
Radius	0.030 in.

Drilling

Material	cobalt high speed steel
Point angle	118°
Clearance	12 to 15° on 28° spiral

Reaming

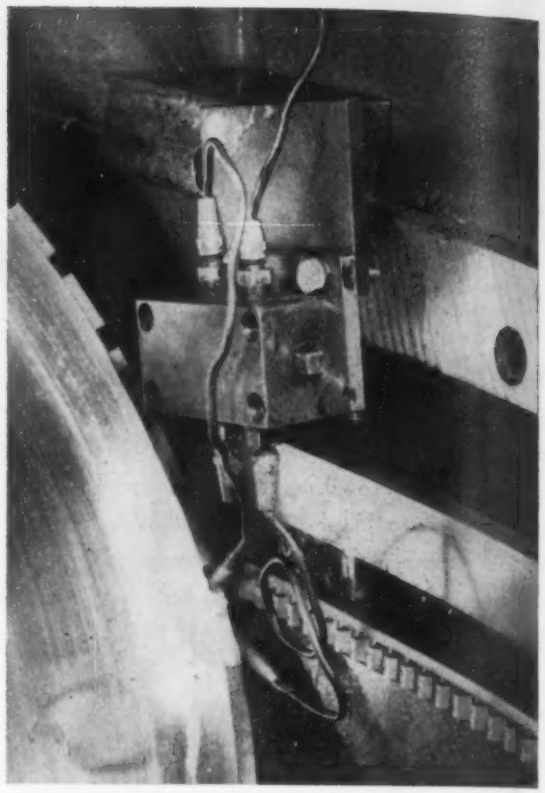
Material	carbide tips
Flutes	4
Back taper	0.0002 in. per in. flute length
Primary clearance angle	10 to 15°
Chamfer angle	45°

Tapping

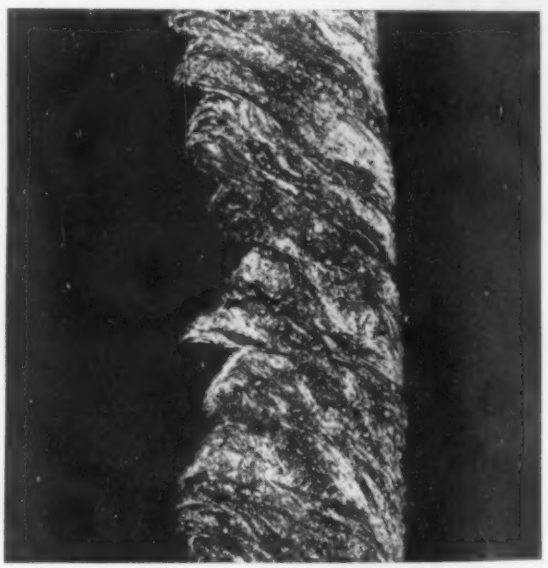
Type	Interrupted 3-flute, spiral point tap.

Milling

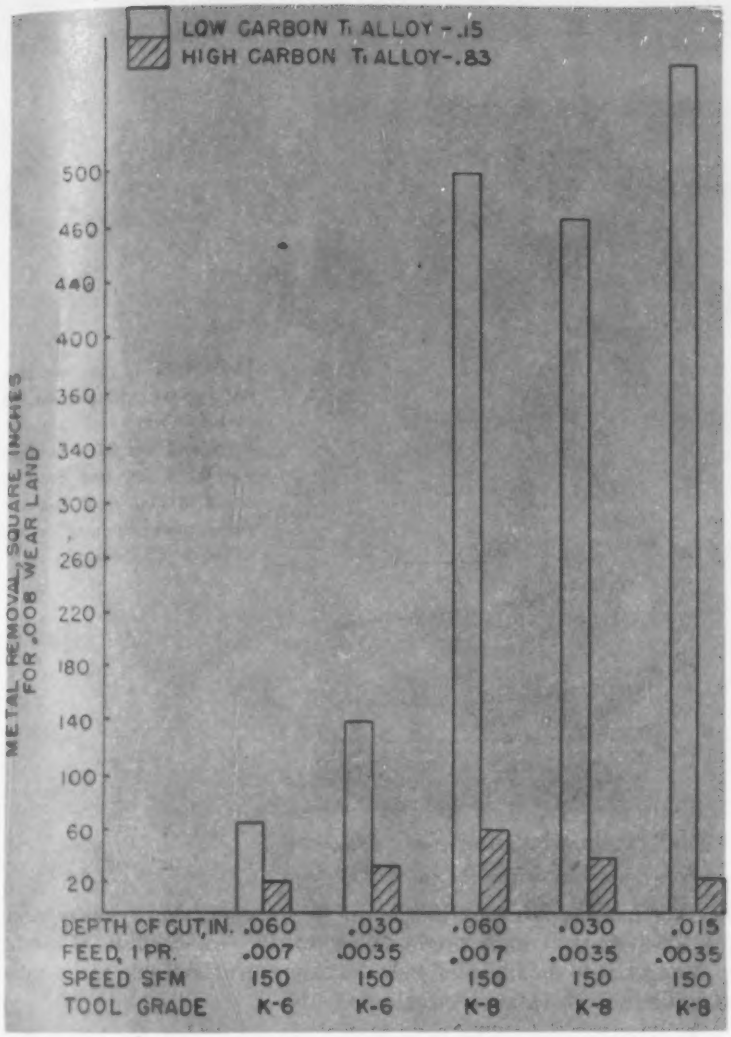
Material	18-4-1 high speed steel
Rake	10°



CARBON DIOXIDE gas is used as a coolant in broaching titanium. It has also given excellent results in turning operations, and use is recommended wherever practical.



PHOTOMICROGRAPH of a typical titanium chip removed from high carbon alloy. Chip is segmented and curly. Coolant used was carbon dioxide gas. 100X.



TOOL LIFE plotted against metal removed, finish turning cuts. Tool geometry (see opposite page) with side rake at 6°. Vastly superior machinability of low-C alloy shows.

in. depth of cut will produce a 50 to 60 microinch finish. Good tool life is also obtained using 0.0035 ipr, with 150 to 200 sfpm, and 0.015 in. depth of cut on the low carbon titanium alloy.

Some experimental work has been completed with CO_2 gas as a coolant. Initial results are highly encouraging and warrant additional attention. For example, approximately 250 cu in. of metal were removed from a large diameter disc of high carbon titanium alloy at 160 sfpm, 0.023 ipr feed, ¼ in. depth of cut, using CO_2 coolant. Examination of the tool tip revealed only approximately 0.010 in. land wear and no burning or build-up.

In all turning operations the work should be held rigidly, and the tool should have minimum overhang and be supported firmly.

In broaching, present information indicates that each tooth should be loaded about 0.003 to 0.005 in. Shave cuts should be avoided from the standpoint of work hardening. Design of the broach naturally depends upon the work being performed. Staggered tooth loading with a shear type of cut reduces friction. With this design, the teeth should be well supported.

The use of CO_2 gas here has given excellent results and tests are still being conducted. The broach should be designed so that a maximum amount of gas can be carried into the work by the broach. Broach bar speed is maintained at 6 to 8 fpm, but considerably higher speeds will undoubtedly be feasible as the full capabilities of the CO_2 coolant are utilized.

Carbide-tipped broaches have performed satis-

TABLE I

NOMINAL CHEMICAL ANALYSIS OF TITANIUM

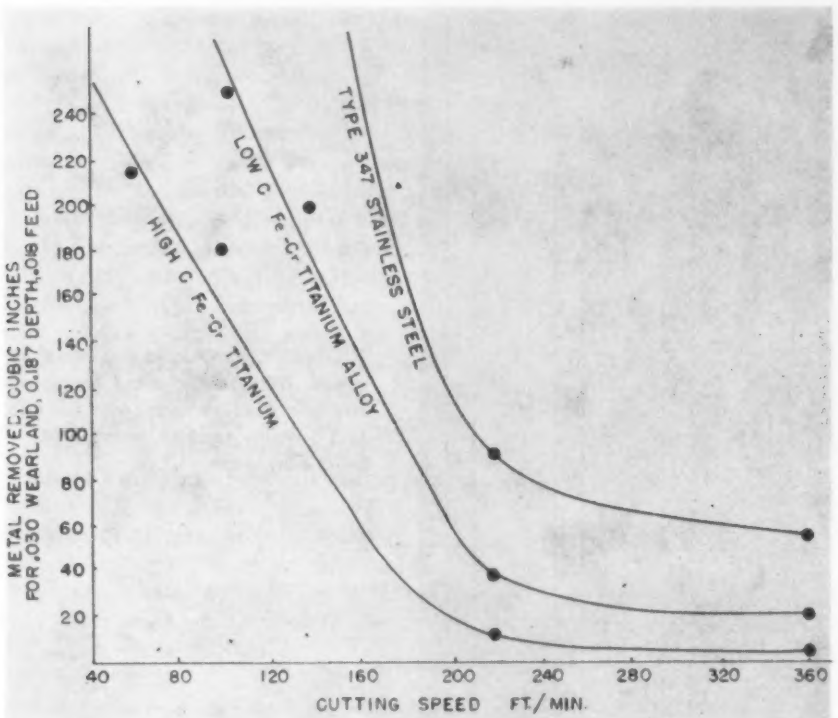
	Cr	Fe	C	N	O	Ti
High-C 9466	2.4	1.1	0.6	0.08	.....	Bal.
Low-C 9466	2.6	1.3	0.2	0.08	.....	Bal.
9480 (Ti 150A)	2.7	1.4	0.05 max.	.....	0.30	Bal.

TABLE II

AVERAGE TENSILE PROPERTIES
Large Forgings

	Tensile Strength, psi	Yield Strength, psi, 0.2 pct offset	Elongation, pct
High-C 9466	125,000	115,000	5
Low-C 9466	130,000	120,000	10
*9480 (Ti 150A)	135,000	125,000	10

* Based on very limited data.



TOOL LIFE, in roughing, plotted against cutting speed. K-8 carbide was tool material. Wearland was 0.030 in. Feed was 0.018 ipr, and depth of cut 0.187 in. Tool geometry shown under "turning" in tool listing, p 108. Side rake was 6°.

factorily. High speed 18-4-1 steel does not have sufficient abrasion resistance to give adequate tool life with high carbon material. Modifying 18-4-1 with additions of cobalt has given increased life, and it is expected that cobalt-vanadium high speed steel will give still better results.

In broaching, as in turning, the workpiece should be rigidly supported. One-pass broaches should be used whenever possible.

Through-hole drilling of holes of ½ in maximum depth has been done on a production basis. Best tool life is obtained from cobalt high speed steel, although standard high speed steel drills give fair results.

Drills should be ground with a notch to act as a chip breaker. A satisfactory tool grind has a 118° point angle with 12 to 15° clearance on a 28° spiral. Stub length drills should be used if possible. Highly sulphurized oils give good results, as do some special wax-mineral oil mixtures.

Using 12 to 15 sfpm with 0.008 to 0.020 ipr feed on drills up to 0.250-in. diameter produces good results. As an example, using 0.013 ipr feed, 13 sfpm, a total of 29.6 in. was drilled. Hole depth was 0.400 in. A standard high speed steel drill drilled only 10½ in. using a speed of 20 sfpm and 0.003 ipr feed. Hole depth was 0.125 in.

Machine-operated carbide-tipped reamers have given good service. Best surface speeds are 100 to 200 sfpm, and feeds 0.005 to 0.008 ipr. Four-flute reamers are used. Depth is 0.012 in., minimum, to 0.030 in. on diameter. Back taper is 0.0002 in. per in. of flute length. Primary clearance angle is 10 to 15° on carbide. Chamfer angle is 45°. Highly sulfurized oils make satisfactory coolants.

The type of tap recommended for titanium is an interrupted 3-flute, spiral-point tap using an operating speed of 12 to 15 sfpm. Sulfurized oils and some waxes have produced good tap life.

Some external threading experience has been gained in making laboratory specimens and some developmental parts. In this work, high speed steel threading inserts were used in a tangential collapsing geometric die head with good results.

Milling of the high carbon alloy cannot be accomplished with facility and tool life is very short. Lower carbon alloys show a considerable improvement, but considerable work remains to be done.

At present, practice in milling can be briefly summarized as: Table feed, ½ to ¾ in.; speed, 32 to 45 sfpm; rake, 10°; cutter width, 3/16 in.; tool material, 18-4-1 high speed steel.

Whatever the type of machining, machine tools must be rigid with minimum bearing play. Tools should be finished on a 150 grit or finer wheel, and should be designed so that the cutting edges have adequate clearances to avoid side drag. Titanium should never be cut with a dull tool. Tools should be rigidly clamped. High pressure directional cooling on the cutting edge is important so that maximum tool life is obtained. Use of CO_2 gas is recommended wherever practicable.

Continuous carbon restoration furnace BOOSTS PRODUCTION

By J. D. Armour
Chief metallurgist
Union Drawn Steel Div.
Republic Steel Corp.
Canton, Ohio

The new 6-zone, continuous carbon restoring-annealing furnace at Union Drawn Wire Div. has increased production over batch methods 112 to 240 pct, per invested dollar. Greater uniformity of surface carbon and shorter cycles have also been obtained and "scalloped" bars have been eliminated. The furnace handles bars up to 6 in. diam, and coils up to 54-in. diam. Atmosphere is controllable; time in the furnace is variable from 1 to 24 hr at temperatures of 1400° to 1800°F.

Everyone associated with wear and strength problems in steel appreciates the importance of maximum hardness and tensile strength on the surface of heat-treated parts. This is especially apparent in such parts as cap screws, bolts, king pins, springs, and in many applications of shafts.

It has been found commercially practical in some cases to use the carbon restoration process to eliminate machining off of decarburized surfaces or the addition of carbon by carburizing or cyaniding. The results of induction hardening as well as conventional hardening are benefited by a uniform carbon concentration.

Maching wastes material, and is an expensive operation. Carburizing and cyaniding, although less expensive than machining, also increase overall manufacturing costs. In some instances the resulting surface hardness is too high for the intended application. The first paper on the carbon restoration process was presented in 1944 by Cullen.[1] Many specific applications of the process have been presented subsequently by Armour[2] and Tschopp.[3]

The authors de Coriolis, Cullen and Huebler

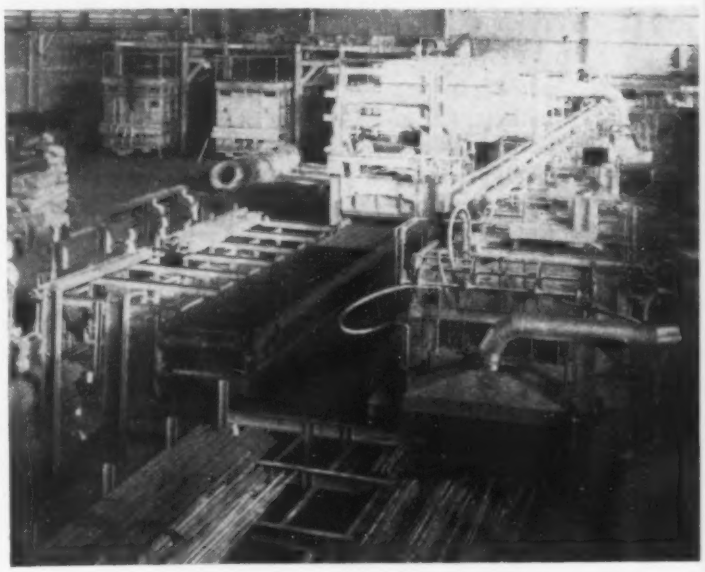


FIG. 1—The new continuous roller hearth furnace for carbon restoration and annealing of bars and coils is shown in foreground. Older batch-type equipment is at the left in the background of this illustration.

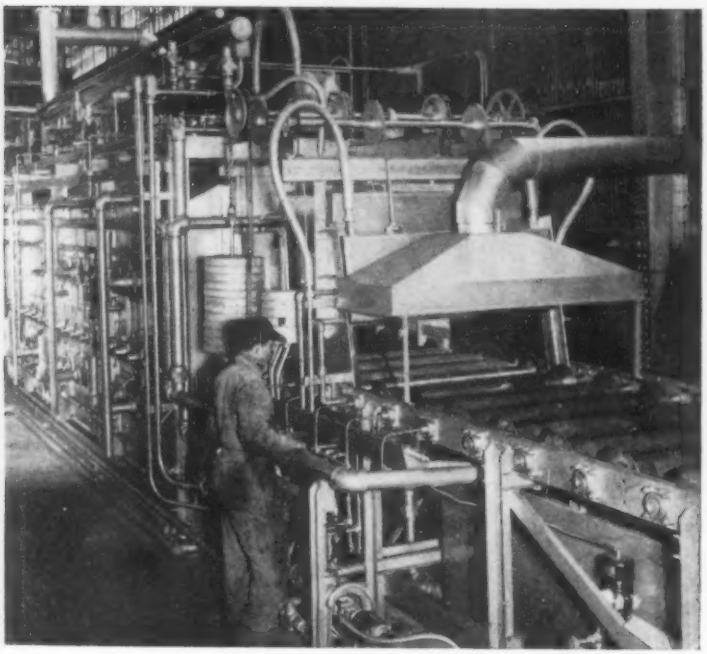


FIG. 2—Charging end of roller hearth furnace for continuous carbon restoration and annealing.

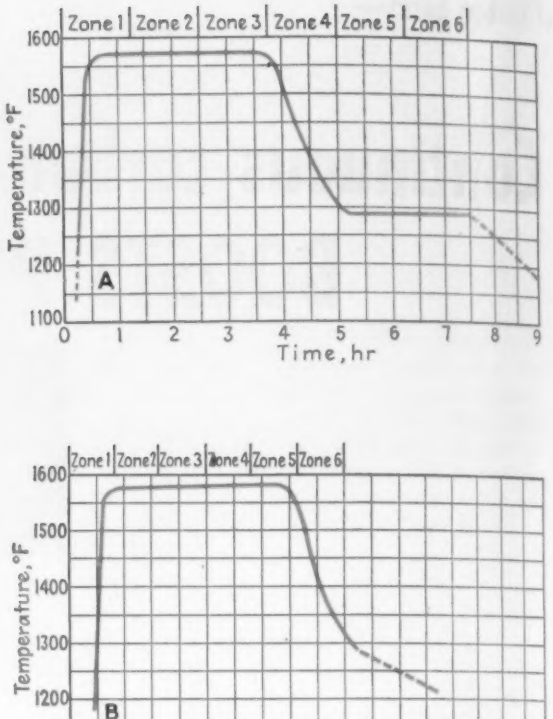


FIG. 4—These are the furnace cycles most frequently used for carbon restoration-annealing. Curve "A" is typical for alloy steels such as 8640, 4140 and 5140. Curve "B" for plain carbon steels such as 1035 and 1045.

have presented the theoretical concepts of carbon concentration control.[4]

Reviewing this process briefly, a gaseous system composed of carbon dioxide (CO_2), carbon monoxide (CO), hydrogen (H_2), methane (CH_4), water (H_2O) and nitrogen (N_2), is always in equilibrium with a particular carbon concentration in steel at a particular temperature. The carbon equilibrium of the atmosphere can be predicted on the basis of the analysis and dew point. Of these gases, carbon monoxide and methane are carburizing. Carbon dioxide, water vapor and moist hydrogen are decarburizing. Nitrogen is inert.

Carburizing reactions defining this system are shown in box on opposite page. In these reactions, CO and CH_4 are the possible sources of carbon. The carbon equilibrium of these particular reactions is established by the percentages of either CO_2 or H_2O[5]. Intergaseous reactions function in such a manner that with fixed amounts of CO and H_2 the quantities of carbon dioxide and water vapor have a definite relationship.

Recently, a continuous carbon restoration installation was completed at the Union Drawn Steel Div. of Republic Steel Corp. This unit was built by Surface Combustion Corp., Toledo, Ohio, and it supplements the annealing and carbon restoration facilities in this plant. Prior to the installation of this continuous roller hearth furnace, all carbon restoration annealing was confined to batch-type car-bottom furnaces. Fig. 1 shows the new continuous furnace on the right and the car-bottom furnaces on the left. The new equipment combines the inherent advantages of continuous operation with the precise atmosphere control conditions necessary for carbon restoration. This furnace is the first and only one of its type.

A capacity comparison between the batch and

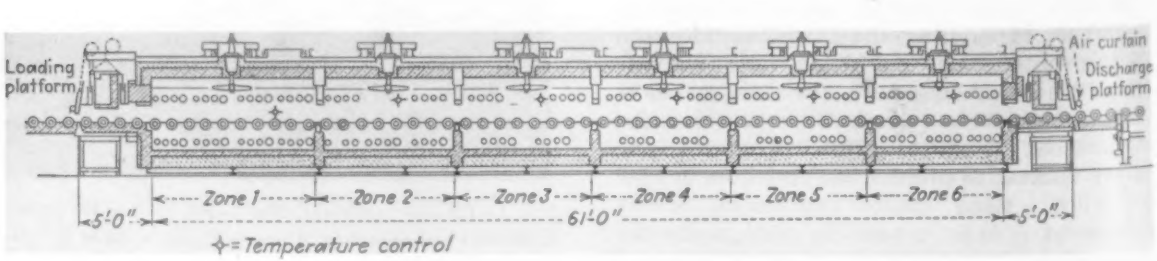


FIG. 3—Cross-sectional drawing of the new furnace.

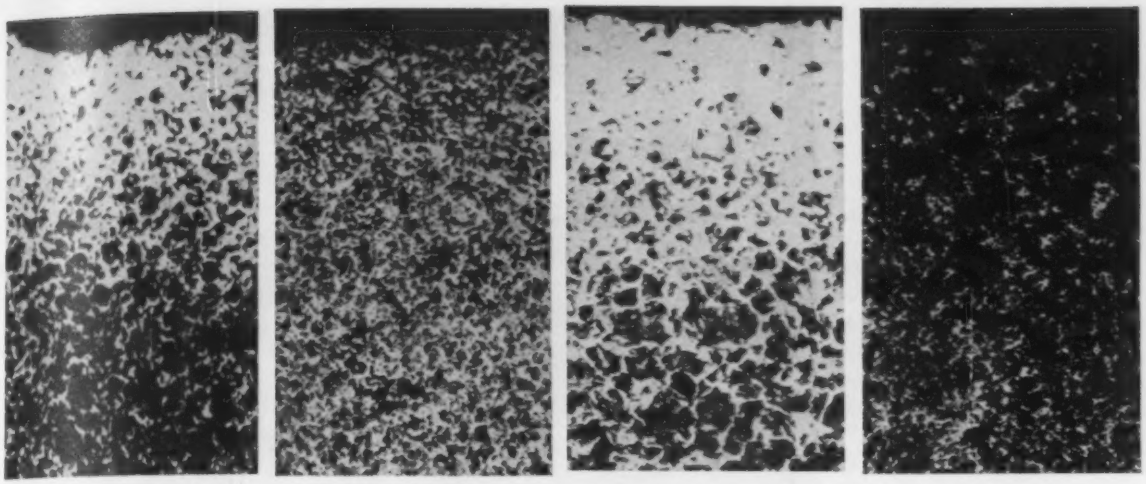


FIG. 5—First two pictures at the left show AISI 5046 before and after treatment in the cycle described in Fig. 4A. At right, before and after condition at AISI 1050, after treatment in cycle described in Fig. 4B. 100X.

continuous furnaces is shown in the table on page 114. While the resultant products are comparable, it can be seen that the continuous furnace has as much as 240 pct greater capacity than the batch units treating the same steel, this does not mean that batch furnaces no longer have a place in steel mill annealing processes. Where frequent changes of widely different cycles are contemplated, more efficient production is possible with batch furnaces.

The basic furnace design had to satisfy the combined requirements of atmosphere control and flexibility in time-temperature cycles, as well as accommodating a wide range of bar and coil sizes. Atmosphere control was made possible by properly placed atmosphere inlets, adjustable throats on either end of the furnace, water-cooled doors, effective air curtains and recirculating fans. Time in the furnace is readily controllable between 1 and 24 hr, at temperatures ranging from 1400° to 1800°F. The maximum size for bars is 6 in. For coils, the limit is a 54-in. diam.

Treating both bars and wire coils in one furnace complicates the problems of atmosphere control. When treating bar stock the furnace opening for charging and discharging is limited to about 6 in. With this size opening atmosphere control is not difficult. Coils, on the other hand, require an entrance or discharge height of approximately 14 in. The engineering features used to solve this problem are shown in Fig. 2. When treating bars, adjustable bungs located at each end of the furnace are lowered to a position approximately 2 in. above the bars. The throats thus formed are used in conjunction with effective air curtains, sealing the ends of the furnace against air infiltration. When treating coils, water-cooled doors plus high-speed rollers and a super-purge are combined to avoid air contamination of the atmosphere.

The furnace is divided into six zones of 10 ft each, giving an overall length of 60 ft, Fig. 3. Effective width is 4½ ft. Each zone is independently controlled, allowing the flexibility of temperature demanded by isothermal annealing. Each zone has independent atmosphere inlets and recirculation fans. The independent inlets permit control of the carbon potential in each zone practically independent of adjoining zones. Each recirculation fan provides atmosphere movement and thereby prevents stratification.

Alloy rollers are made of 15 chromium—35 nickel heat-resisting alloy and are mounted on 15 in. centers. The design stress per roller is 600 lb per roller at 1600°F. The rollers are driven by a continuous chain over 300 ft long which is powered by a 2 hp motor through a Reeves standard ball-bearing transmission. All roller-hearth bearings are water cooled by a central water system that also cools the doors, the jackets around the charge and discharge vestibules and the atmosphere recirculating fans.

Multi-pilot burners used

Standard "W"-shaped alloy radiant tubes equipped with multi-pilot gas burners are used for heating. The furnace is so piped that the radiant tubes can be used for either heating or cooling. Air may be drawn through the tubes to accelerate cooling. This is one of the distinct advantages of the suction type radiant tube.[6]

In batch operations, bars have a tendency to sag over supports thus creating a scalloped effect on the bars. This scalloped effect causes processing difficulties in pickling, drawing and straightening and is an especially bothersome problem with small-diameter bars. A very desirable feature of the roller hearth furnace is its ability to keep the bars straight during the entire heating and cooling cycles.

Lifts containing approximately 20,000 lb of pickled bars are loaded on the charge table stor-

REACTIONS TYPICAL OF CARBURIZING

$$Fe + 2CO = Fe(C) + CO_2$$
$$FE + CH_4 = Fe(C) + 2H_2$$
$$Fe + CO + H_2 = Fe(C) + H_2O$$

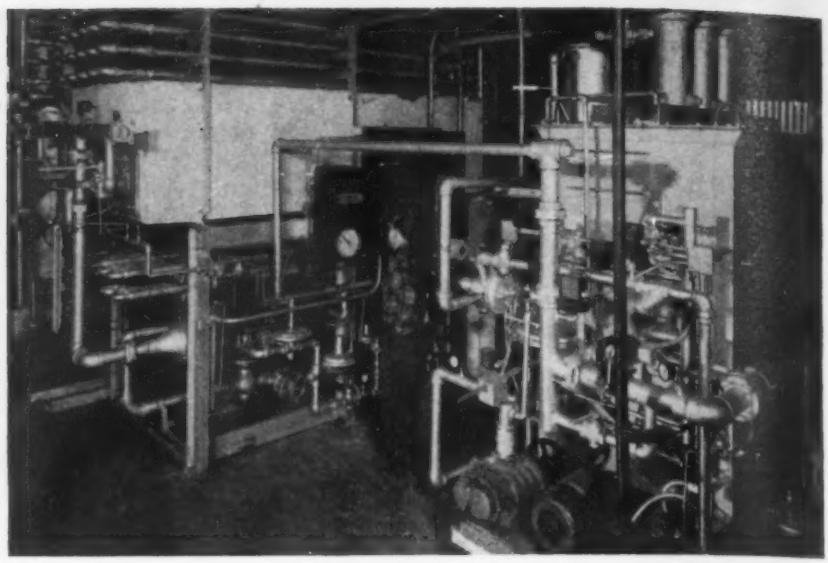


FIG. 6—Controlled atmosphere equipment used with the new furnace. Unit for production of RX gas is shown in foreground. NX in background.

Continuous carbonizing-annealing (continued)

age rack, when this type of stock is being treated. Two operators then transfer the bars onto the charge table where the driven rollers convey the bars through the furnace onto the discharge table where they are automatically "kicked off" into a holding rack. The bars are then ready for repickling and cold drawing. If samples are desired for hardness tests and metallographic examination, they are taken from this holding rack.

Total time in the furnace is determined by the load, operating temperature, depth of decarburization and times required for transformation to either a lamellar or spheroidal structure. To calculate the total time it is necessary to know the size of bars, quantity to be treated, depth of load, depth of decarburization and type of steel. The depth of load is limited by the strength of the rollers, desired metallurgical uniformity and availability of bars for treatment.

Furnace operation while treating coils varies somewhat from operations with bars. To prevent loops of the coils sagging under the rollers, it is necessary to load coils on pallets. The furnace is designed to handle coils loaded 14-in. high on 1-in. high pallets. The pallets are loaded consecutively on the charge table and the coils placed on the pallets with an overhead crane. As the loaded pallets approach the charge door, a limit switch is actuated, the door opens and high-speed rollers move the pallet through the open door.

After the pallet has cleared the door, a second switch is actuated causing the door to close and the high speed rollers to stop. In this manner the door is only open for approximately 15 sec every 30 min. A similar procedure is followed at the discharge end of the furnace.

Fig. 4 is a graph of the most frequently used furnace cycles. Graph "A" is characteristic of annealing alloy steels such as 8640, 4140 and 5140. The upper holding temperature of 1575°F is to austenitize and restore carbon. The lower holding temperature is to complete the transformation to lamellar pearlite. Graph "B" of

BATCH AND CONTINUOUS FURNACES COMPARED*

Steel	Size, in.	Cycle time, batch, hr.	Cycle time, continuous, hr.	Increase in production pct	Brinell Hardness	Remarks
4140	1½ bars	32-34	8½	240	197	Lamellar structure
4140	½ coils	55-60	8½		197	
1050	1½ bars	24	5	160	179	Lamellar structure
1050	½ coils	40 to 45	5		179	
52100	1 bars	75	24	112	187	Spheroidal structure

* This capacity comparison between batch and continuous furnaces is based on per invested dollar in furnace equipment.

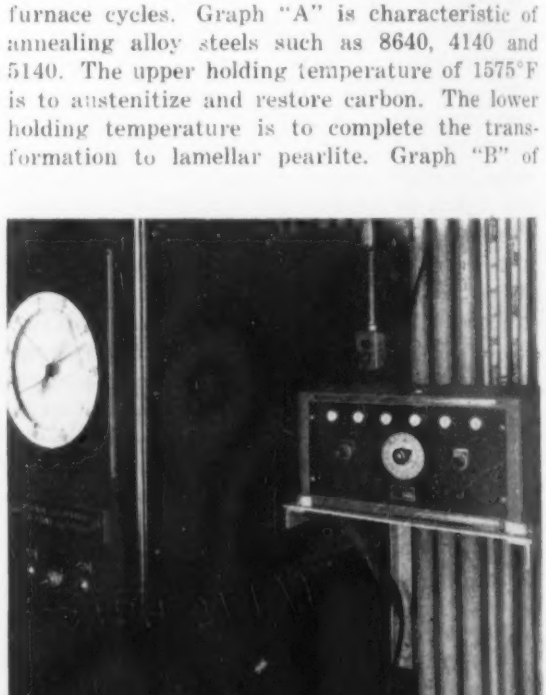


FIG. 7—This indicating and recording equipment reports dew points in all six furance zones.

Fig. 4 is typical of the cycle used in the carbon restoration annealing of plain carbon steels. As the transformation to lamellar pearlite is quite rapid with plain carbon steels, it is not necessary to hold at a low temperature after the austenitizing treatment.

Replacement of carbon in decarburized areas is shown quite clearly in Fig. 5. These are representative photomicrographs made of an alloy steel, AISI 5046, before and after treatment on the cycle shown in Fig. 4A. Note the absence of either high or low surface carbon. The hardness of this particular steel was 187 BHN.

The microstructure before and after carbon restoration annealing of plain carbon steel is also shown in Fig. 5. In this instance the surface carbon after carbon restoration is slightly higher than core carbon. This is intentional because of the subsequent induction hardening of the steel. It has been found that higher surface carbon is beneficial in eliminating spotty surface hardness. At the same time, the steel is not as subject to quench cracking, which is characteristic of initially high-carbon steels during induction hardening.

Routine procedure with the new furnace includes checking hardness and microstructure. Definite operating limits have been established for hardness, range of surface carbon, grain size and microstructure in the annealed steel.

As the temperature of any given carburizing atmosphere decreases, the carbon potential increases. When the carbon potential exceeds the solubility of carbon in austenite at any particular temperature, there is a tendency for carbon to deposit out of the atmosphere. Carbon in this form is objectionable because it is unpleasant to handle, difficult to pickle and shortens alloy life. In many atmosphere furnaces a carbon buildup and sooting in the furnace occurs in the transition temperature from the hot zone to the cooling zone. Annealing temperatures involve high carbon deposition conditions.

To overcome this anticipated problem, two types of prepared atmosphere gases are used, Fig. 6. An RX gas plus some natural gas for enrichment are used to maintain the carbon potential in the high temperature zones. During cooling from the austenitizing temperature and at the lower holding temperature, an inert atmosphere, NX, is mixed with the carbon-balanced atmosphere from the hot zones. In this manner the carbon potential is reduced during cooling, eliminating high surface carbon on the bars and sooting in the furnace.

An important part of the controlled atmosphere, roller-hearth furnace installation is the dew point recorder. This equipment automatically indicates and records the dew point from as many as six different sources, Fig. 7. Furnace gases for sampling are pumped from the furnace to the recorder in copper tubing. The selector is so designed that if the dew point in the atmosphere from a particular zone is not being taken the pumped gas is vented. In this way all lines are constantly purged.

Reference to the dew point chart is a reliable indication of the furnace operation. It has been found that if the dew point is within established limits the surface carbon will be within specifications.

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[2] Armour, J. D. "Carbon Correction for Steel Bars," Steel, March 7, p. 106, Vol. 124, No. 10, 1949.

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[4] deCorioilis, E. G., Cullen, O. E. and Huebler, J., "Carbon Concentration Control," ASM Proceedings, p. 659, Vol. 38, 1947.

[5] Groves, W. T., "Dew Point vs Pct CO_2 as Furnace Atmosphere Control Check," Industrial Heating, June, p. 966, Vol. 16, No. 6, 1949.

[6] U. S. Patent 2,047,471.

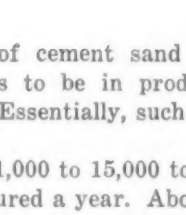
NEW BOOKS

"The Science of Flames and Furnaces," by M. W. Thring. Furnace use came long before we knew anything of the chemistry or physics of heating processes. This, and the difficulty of isolating thermal processes for study, resulted in neglect of furnace research. Mr. Thring, head of the physics department of the British Iron and Steel Research Assn., has filled this deficiency. Important chapters are on the thermodynamics of furnace heating, liberation of heat by combustion, heat transfer, aerodynamics of hot systems, and the science of furnace construction. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.50. 416 p.

"Electrolytic Manganese and Its Alloys," by Reginald S. Dean. Progress of electrolytic manganese production and development of its uses since 1936 are recorded, and ferrous and nonferrous alloys are described. A substantial portion of the book is based on previously unpublished material from Dr. Dean's laboratory work. Ronald Press Co., 15 East 26th St., New York 10, N. Y. $12.00. 257 p.

"General Metals," by John L. Feirer. First in an Industrial Arts group, the book gives students basic knowledge in metalworking. Sections are presented on sheetmetal, art metal and jewelry, forging, heat treating, foundry, welding, machine shop. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. $3.00. 257 p.

CUT MOLD COSTS with cement sand



By N. A. Jeppesen
Burmeister & Wain A/S
Copenhagen, Denmark

Molds made of sea sand and cement instead of clay were introduced to get rid of smoke and carbon monoxide hazards. In Denmark it was found that the savings in molding time, coke and consumption of gaggers, rods and nails was large enough to overcome the somewhat higher cost of cement sand. Parting the pattern from the dried mold presents problems, but they can be solved. Castings up to about 15 tons have been successfully made.

The biggest advantage of cement sand as a molding material seems to be in producing large and heavy castings. Essentially, such work is pit-molded by hand.

In this foundry, some 11,000 to 15,000 tons of Meehanite castings are poured a year. About 50 pct of the castings weigh from 2 to 30 tons. All such big castings were previously made in dry sand molds. For the drying, a special portable furnace fired by coke and placed on top of the mold was used. By means of compressed air, the combustion is forced and the hot air circulated in the mold. These furnaces work very well, but it is impossible to discharge the smoke from them outside the foundry.

Another important reason for introducing cement sand is that supplies of very cheap sea sand are available and easily delivered. Initial research showed that this sand was excellently suited as base sand in cement mixtures. It is also a good backing sand with high permeability. It can be used without any additions.

Considerable reduction in molding time has also been achieved. This is due to less ramming, less reinforcing and little or no venting of the mold. There has been a reduction in the consumption of gaggers, nails and other mold reinforcements.

Fewer scrapped castings have resulted because less care in molding practice is required to obtain

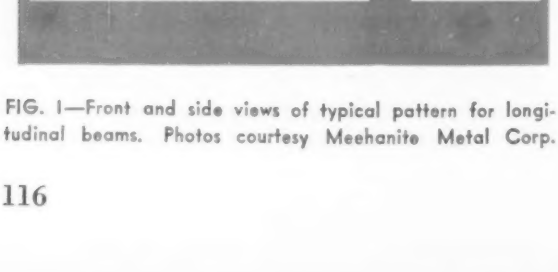


FIG. 1—Front and side views of typical pattern for longitudinal beams. Photos courtesy Meehanite Metal Corp.

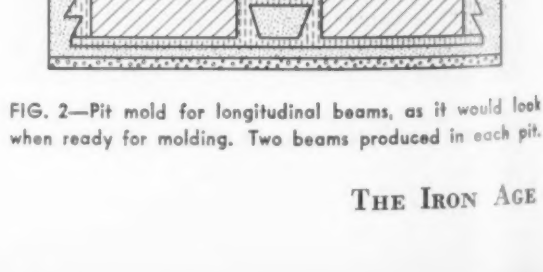


FIG. 2—Pit mold for longitudinal beams, as it would look when ready for molding. Two beams produced in each pit.

a good result. Further, there is the possibility of employing unskilled labor to a greater extent. Better appearance of the castings also results if a good and very heavy blacking is used.

Preliminary experiments indicated that these advantages were well worth while. However, they also showed that the use of cement sand involved some disadvantages. Difficulties were encountered in adapting patterns, coreboxes and other equipment to meet these unfavorable circumstances.

Must be used in 4 to 5 hr.

Among the disadvantages is the fact that prepared cement sand must be used within a short time after the milling. When Portland cement is used, the maximum period is 4 to 5 hr.

There has to be good cooperation between the sand preparation department and the department where the cement sand is to be used. The prepared cement sand must be delivered in portions suited to the need, not in a continuous stream to a hopper for storage. As far as possible, the storage of prepared sand on the floor in a heap should be avoided.

Where cement sand is used exclusively for large castings the time factor is less important. This is because it is possible to begin the coring-up operation during the setting time. Thus, the casting can be poured at the same time, or earlier, than when it is molded in the usual way in dry sand molds.

To make sure that the molds are sufficiently dry for pouring, it is necessary to store the molds for 48 to 72 hr before pouring.

When the cement hardening reaction has been completed, the pattern sticks tenaciously to the mold. This is due to the great strength of the mold and also to the heat developed during the chemical reaction. This heat causes the pattern's varnish to adhere.

Green strength low until hardening occurs

The green strength of cement sand is very low until hardening occurs—about 12 hr after milling. This makes it necessary to keep the pattern as simple as possible. The pattern should be provided with a liberal tapper. A tapper up to 5 pct will facilitate the molding operation considerably.

Loose pieces ought to be replaced by cores placed in the mold during the ramming.

The pattern should be drawn as fast as possible. Otherwise, it should be made so that it can be parted in the mold and taken out in pieces. Furthermore, copes should be made in special coreboxes or the pattern should have a shape that allows for the impossibility of lifting the cope before the cement has hardened. This occurs 12 to 18 hr after ramming.

Due to the slight ramming work entailed it is possible to mold large and complicated castings within a normal working day. Ideal equipment for molding in cement sand it: (1) Flask molds, where the pattern is parted so that both halves

FIG. 3—Drag used for longitudinal beams.

can be placed on boards; (2) pit-molding, for which the cope should be made in coreboxes. The pattern or a part of it is replaced in the drag, after setting of the cement, to form the cope pattern.

This method is the usual one, and this foundry uses it with good results from many types of castings. However, 1½ years ago when cement sand was introduced in this foundry, the types of castings of greatest interest would have required considerable expense for new patterns and new equipment.

Therefore, another method was tried, permitting the use of existing equipment. The experiments came out very well, but the applications are limited. This method follows mainly that employed for the same castings made in black sand. It differs from normal cement sand practice in that the pattern is kept in the mold during molding of both drag and cope for 48 hr, until the cement in the cope has hardened.

Two castings were first chosen for molding in cement sand. These were a longitudinal beam for a large bedplate and a bedplate for a small engine. Longitudinal beams have a shape as shown in Fig. 1, which also shows how the pattern is parted. The pattern consists of a main part on which loose pieces are bolted. On the bottom, loose plaques are placed.

Two castings are made in each mold, Figs. 2, 3 and 4. The molding operation is carried out as described in the accompanying box.

The entire molding operation is carried out in the course of 3 days, and the pattern stays in the

TIME BREAKDOWN ON BEAM MOLD*

Molding of drag and cope	34 hr	
Molding of bottom between plaques	17	79 hr
Finishing of cope and drag	28	
Coring up and assembling of mold		21
		100 hr

* Two longitudinal beams are cast in each mold.

mold for 2 days. The mold is hard when the pattern is drawn. Only when the pattern is very solid and divided in a suitable way is it possible to draw the pattern without difficulties.

On places where difficulties in pattern draw arise, tin plates may be used. Investigations are being made to find a better varnish for use with cement sand. Oil has been used with good results, but Cuprinol painted on the pattern seems to be better. However, it is too early to suggest the use of Cuprinol. Cellulose varnish also seems to work very well.

The next type of casting molded in cement sand was a bedplate, Fig. 5, for a medium size engine. The pattern is a simple box with a bow on top. The box is placed in the drag and the bow in the cope. Most of the pattern consists of core prints. When the pattern is drawn, the bow is lifted off, the box is separated and taken up in pieces. This pattern is therefore easily drawn after 2 days in the mold.

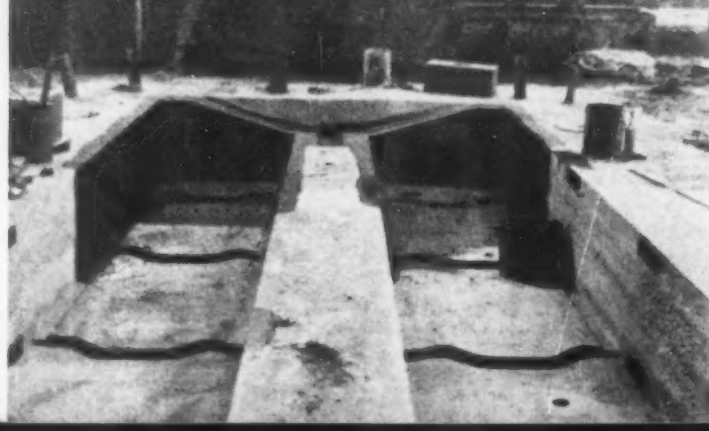
The weight of the longitudinal beam varies between 10,000 to 16,000 lb, and the length from 13 to 23 ft. By now about 40 pieces have been poured weighing about 225 tons all together.

Manhours cut 60 to 67 pct

The manhours are, in the best cases, cut down to 32 pct of the normal time. The average is between 33 and 40 pct of normal time. Two molders and two helpers ram a mold in 17 hr. The finishing operation is done by one or two molders. The total manhours on a longitudinal beam is 100 molder hr and 35 unskilled hr on two pieces. Unskilled hours are about the same as before. The 100 molder hr are used as indicated in the accompanying table.

Of course such a reduction in molding time is met with reluctance by the molders. But when they realize that it is not necessary to work harder to save the time and furthermore, that they get higher pay through the higher production per hour, they are more interested. The saving of the manhours for the bedplates average 50 pct of normal time.

FIG. 4—Patching and blacking of longitudinal beam drag.



In addition, 3 ships' propellers have been poured in cement sand, weighing 18,000, 22,400 and 27,000 lb. They are used as emergency propellers and are not machined on the blades. The casting surface therefore has to be as smooth as possible. The propeller casting is made by use of sweeps and templates. When the pitch varies, the shape of the blades is made after the sweeping operation.

Metal penetration causes trouble

This caused a lot of trouble, but after altering the equipment a little the work was done quite easily. There was also some trouble with burning in and metal penetration into the cement sand. This was due to the heavy section of the casting —about 11⅛ in. near the hub. The usual blackwash mixed to a specific weight of 1.7 provided a very smooth cast surface.

Many different types of external cores are made in cement sand in existing coreboxes. These cores are reinforced in the usual way by means of arbors. The thickness of the cement sand is about 2¾ in. Lumps of used cement sand provide a backing material. The back of the core is covered with a thin layer of cement sand to prevent the backing materials from falling out. Experience shows that it is unnecessary to have vent holes in the cores due to the high permeability of the material.

Until now only a few internal cores have been made, for fear of cracked castings due to insufficient collapsibility of the cores during contraction. However, the 1 to 3-in. casting sections usually poured in cement sand seem to give sufficient heat concentration to secure adequate collapsibility.

Cement sand was tried for a light metal mold. Although it was a heavy-section casting, the tem-

LONGITUDINAL BEAM MOLDING PRACTICE

(1) The bottom of the pit is swept.

(2) The pattern is placed on the bottom. A little sand is squeezed around the plaques to secure them in position.

(3) The drag is molded. Cement sand is used as facing sand and lumps of used cement sand or sea sand as backing sand. Special ingate cores are placed in the mold during the ramming operation.

(4) Parting line is swept.

(5) The next day the cope flask is placed on the drag and rammed with cement sand as facing. A few gaggers are placed in it and sea sand is used as backing sand. A layer of cement sand is placed in the backing sand to give sufficient strength. The top is covered with cement sand.

(6) On the third day the cope is lifted off and the pattern drawn. The loose pieces are drawn first and then the main pattern.

(7) The bottom of the drag is cleaned up and cement sand is placed between the plaques. A cement-water mix is used as binder on the bottom.

perature was too low to permit collapse of the cement sand. Cracking in various places in the casting occurred. Experience shows that high temperature during a certain time is necessary to prevent cracking due to hard cement cores. Of course, it is possible to obtain better conditions by varying the thickness of the cement sand according to the casting section.

Cement sand molds have also been employed for other types of castings produced in large quantities, including large rotors for scavenging air blowers, piston ring castings and small cylinder liners for locomotives. Here cement sand was used because of some trouble in making the castings with the usual black sand mix. Castings of high quality and with a smooth surface, are obtained with a saving in molding time of 10 to 25 pct. Transportation cost and space in the drying ovens is also saved, an important factor in this foundry. However, the main advantage with these castings in cement sand is a better finish and less scrap due to surface defects.

Sea sand costs about 59¢ per ton

The sea sand used is very cheap, about 59¢ per ton delivered alongside the foundry quay. The sand has rounded grains, consisting of about 95 pct silica and with a calcium oxide (CaO) content as high as 0.3 pct. This sand is used for both small castings and heavy work.

Portland cement seems to provide sufficient strength in the proportion used. It also makes it possible to store the cement-sand mixture up to 5 hr.

Normally, this foundry maintains 6 to 7 pct moisture in prepared sand, but on especially hot days this may go up to 9 pct. A high moisture content seems to retard the setting a little.

Normally, only one type of cement-sand mixture is used: 948 lb sea sand with about 3 pct moisture; 93 lb Portland cement; approximately 7 gal water. The mixture is milled in a Simpson mixer for about 5 min. Permeability after 48 hr setting time is 100 to 120, and transverse strength is about 35.6 psi.

The sand is used as delivered, with 2 to 5 pct moisture. If sand and cement were mixed dry and the water added later, a somewhat higher strength would be obtained. However, experience shows that the present strength value is sufficient, and therefore the sand is used in the cheapest state.

The moisture in the sand is checked daily. Water is added to the mixes accordingly. A variation of 1 to 2 pct in moisture content does not affect the quality of the molds.

When castings with heavier sections are to be poured in cement sand it has been necessary to use other means. One mix that has been used consists of 50 pct Belgian silica sand and 50 pct Norwegian silica sand with the usual 10 pct of cement. The result was quite satisfactory.

Another mix supposed to be very good calls for the addition of about 3 pct of coal dust. It has been employed with good results where cores are surrounded with heavy sections. When using coal dust in the cement sand, a gas cushion is developed between the sand grains, preventing metal penetration.

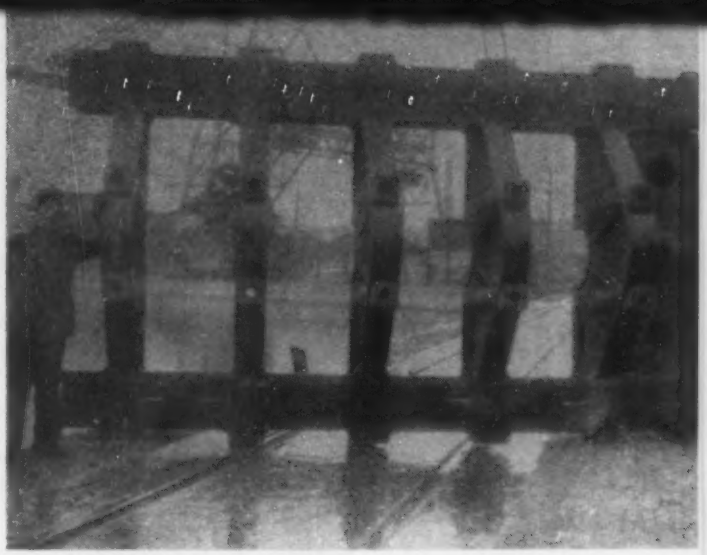


FIG. 5—Bedplate for a medium size engine, made in a cement sand mold and weighing 11 tons.

When the pattern has to stay in the mold for 48 hr as it does in the drag, a little damage to the mold surface on drawing the pattern cannot be prevented. Patching, however, is simpler than in normal molding practice. The mold is hard, and one can step in it everywhere, which makes the patching work easier. When the pattern is drawn, the mold is cleaned out, and loose pieces are removed. The broken mold is then washed with a weak cement-water mix as a binder.

In particular cases, where high strength is demanded, nails are used for reinforcement. For patching, fresh cement sand must always be used. In this foundry's cement sand molds there has been no more than normal patching work.

Parts pressed back

When the pattern is drawn before the cement is hardened, it is possible to some extent to press detached parts back again. However, it is often difficult to obtain adherence. This is due to the difficulties of getting sufficient contact when the cement sand has begun hardening. If parts are loose after hardening they are patched in the normal way.

The price of the cement sand is a little higher than the price of black facing sand, as far as material cost is concerned. The expenses for preparation are almost the same. Furthermore, the sand consumption is higher, and more old sand is left over and has to be carried away. The saving in molding and drying time, in coke, in consumption of gaggers, rods and nails is so large that the method still pays for itself.

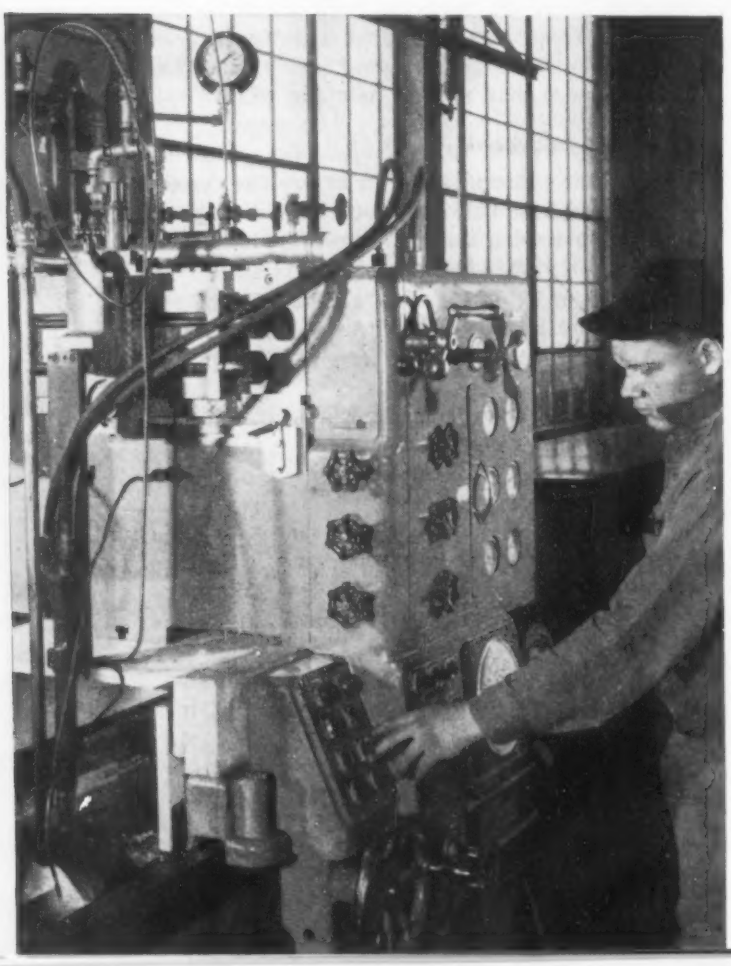
Another thing is that the foundry can be better utilized. Each mold takes up floor space for a shorter time. Delivery time is also reduced, especially when several pieces are to be made from the same pattern.

Unique line HARDENS and CHILLS 16-FT PIECES

By H. W. Dammel
Assistant to the President
Cincinnati Steel Treating Co.
Cincinnati, Ohio

Among products given a flame-hardening and chilling treatment are machine tool wear strips up to 16 ft long. A specially designed flame hardening machine with automatic controls treats wear surfaces of the wear strips. They are then put into an industrial chilling unit where they are held for 24 hr at —120°F for stabilization, or sub zero transformation of the retained austenite. After tempering, the final step is straightening before finish machining and grinding.

FIG. 1—Specially designed flame hardening machine treats pieces up to 16 ft long. Speed is adjustable from 0 to 20 ipm. Various cross sections are accommodated by changing heads. Timing is handled automatically.



A new flame hardening machine and a special chilling unit are now treating machine tool wear strips up to 16 ft long. This heat treating line, which has recently been completed at the Cincinnati Steel Treating Co., begins with a specially designed flame hardening machine, Fig. 1, which will handle parts up to 16 ft long. Flame hardening of various cross sections as well as the approximate shape and sizes shown in Fig. 2 is now in process. The gas-carrying head is also fitted with water quench nozzles.

Hardness is a minimum of Rc 60, a minimum of ⅛ in. deep. Steel is type 91140, a graphitic steel which is partially self-lubricating.

After the hardened strip temperature drops to about +80°F it is put into a chilling unit, unit, Fig. 3, which is held at a minimum temperature of —120°F. To increase heat transfer from the strips, they are immersed in a methylene chloride solution in the unit. The 18 ft long chilling unit is a product of Sub-Zero Products Mfg. Div., Deepfreeze Distributing Corp., Cincinnati.

The —120°F minimum temperature is maintained because tests show that temperature must be at least —110°F to effect the desired stabilization of the steel by the chilling process. This stabilization effect is due to the transformation of retained austenite to martensite.

With ordinary heat treatment this transformation leaves about 10 pct austenite, the bal-

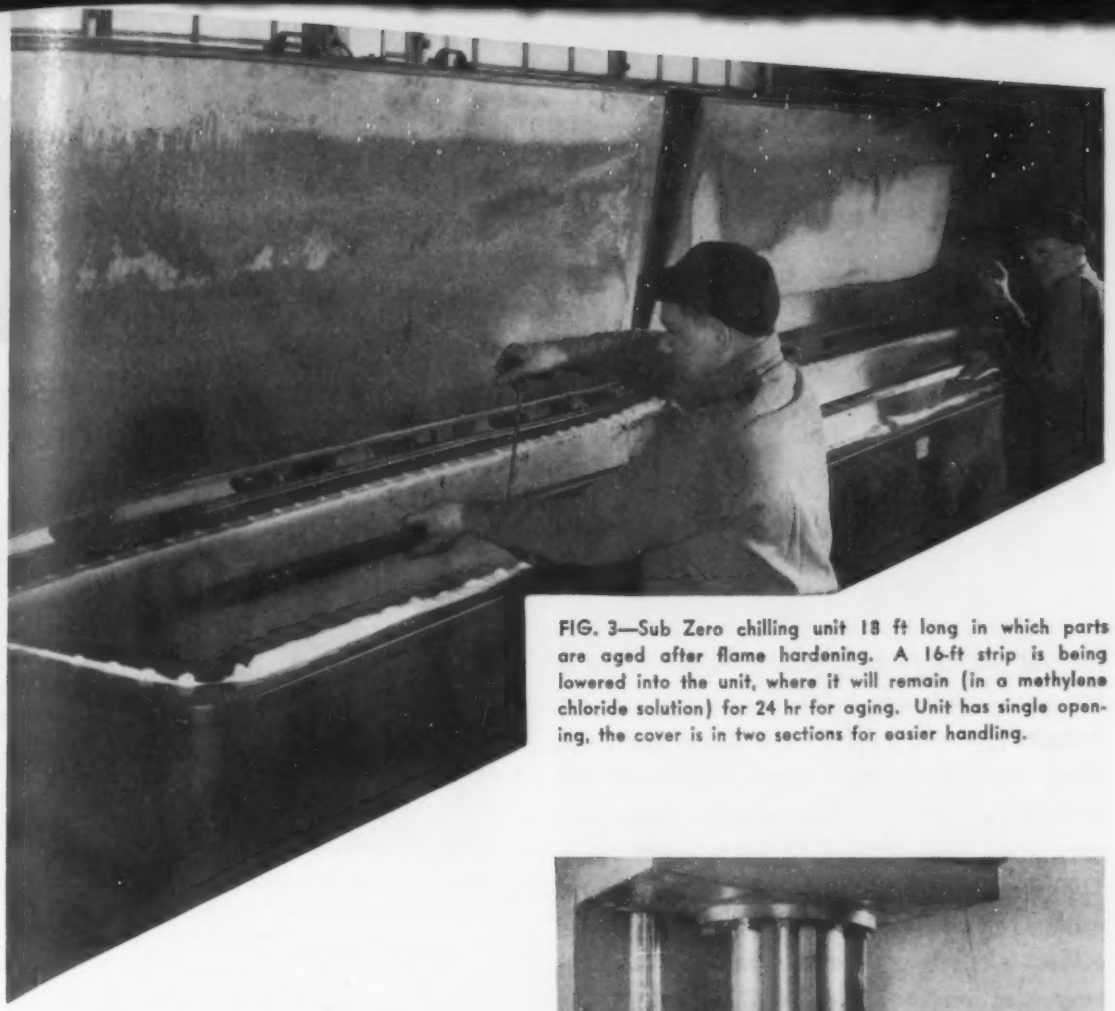


FIG. 3—Sub Zero chilling unit 18 ft long in which parts are aged after flame hardening. A 16-ft strip is being lowered into the unit, where it will remain (in a methylene chloride solution) for 24 hr for aging. Unit has single opening, the cover is in two sections for easier handling.

ance martensite. At —110°F the austenite is approximately 3 pct and practically complete stabilization is reached. In addition to stabilizing the steel, a second effect of the chilling is to increase its surface hardness.

After 24 hr at —120°F the strips are carefully removed and allowed to come up to room temperature.

The next stage is a draw at 350° to 400°F until the martensite formed by the chilling treatment is thoroughly tempered. They are then straightened while hot, Fig. 4, and are ready for finish machining and grinding to final dimensions.

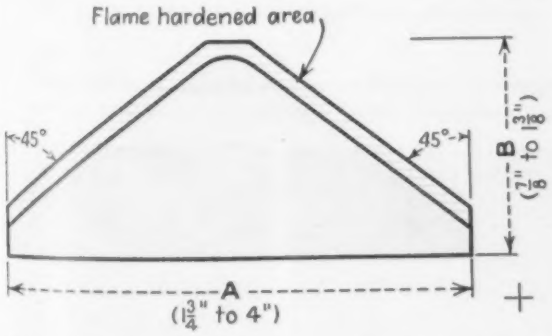


FIG. 2—Machine tool wear strips in the shape and sizes shown here are among the various parts which are now being treated by the flame hardening and chilling process.

FIG. 4—As the last step in the heat treating and aging cycle the wear strips are straightened while hot. They are then ready for finish machining and grinding.

Moly slips one over—

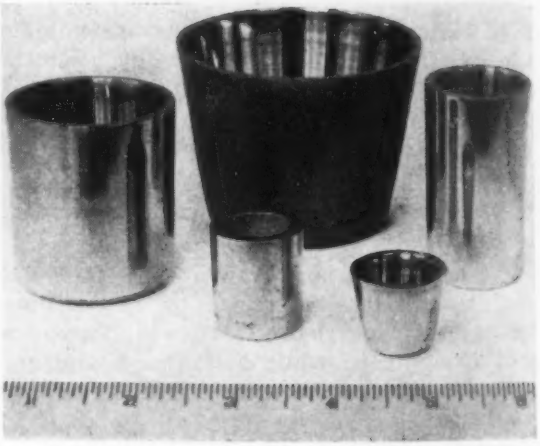
Novel methods used to FORM MOLYBDENUM

By G. L. Miller
Research Department
Murex, Ltd.
Rainham, Essex, England

Two old techniques have been borrowed to aid in forming molybdenum. In one, metal crucibles are formed by pouring a slurry into a plaster mold, then tilting the mold to drain off residual liquid. The drained slip is air dried, then removed. Shapes are oven dried, then sintered at temperatures up to 1700°C in a hydrogen atmosphere. In a second method, molybdenum is hot-pressed under 500 to 600 psi in a corbon mold then baked at temperatures rising gradually from 700°C to 1500°C. The carbide skin is removed by heating in a hydrogen atmosphere at about 1300°C for several hours.

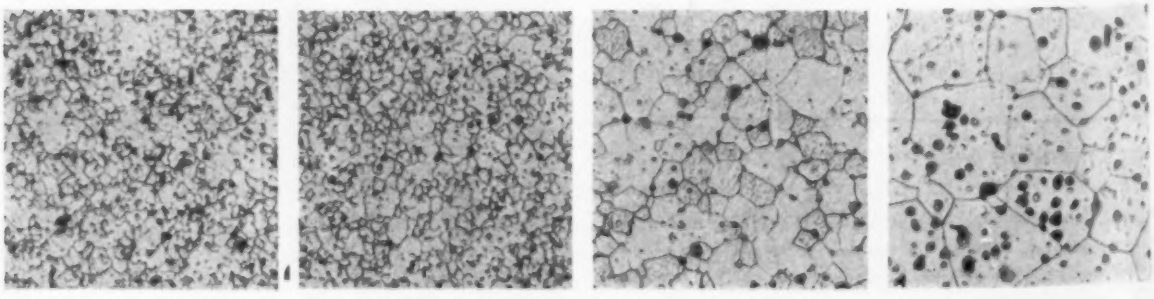
Methods used in the production of ceramic products, and techniques used in making hard metal dies from tungsten carbide-cobalt powder have recently been successfully adapted for use in fabricating molybdenum metal.

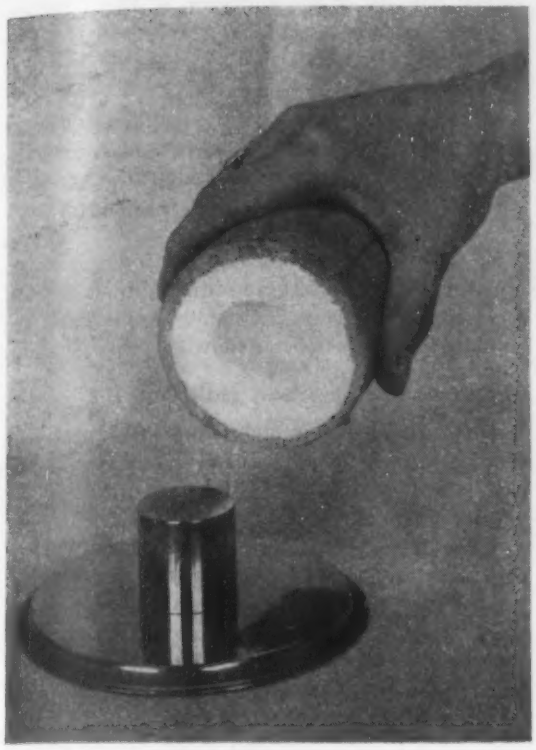
Ceramic materials such as alumina or beryllia powder can be converted to useful articles such as crucibles by slip-casting. Usual procedure is to ball mill the alumina or beryllia with water until a very fine material is obtained. This is converted to a cream-like mixture or slip. Plaster molds are prepared by pouring a slurry of plaster of Paris around a metal or wooden shape, which



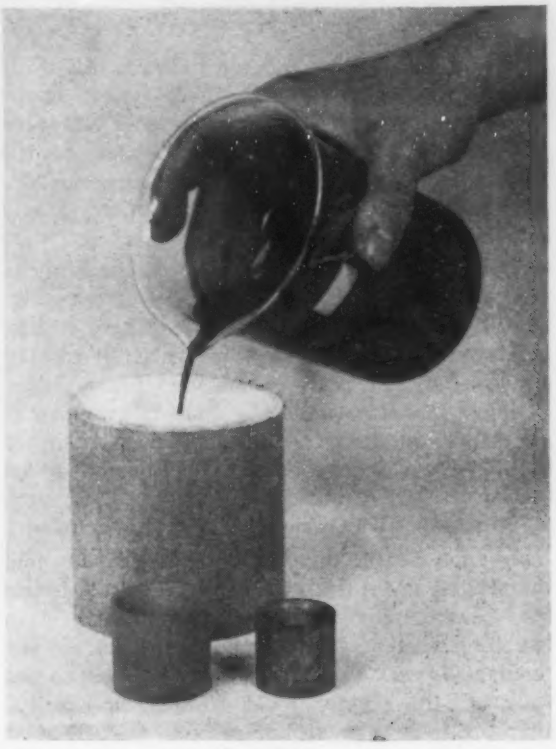
SLIP CAST molybdenum crucibles have excellent finish when machined. Method could be used for solid shapes.

STRUCTURE of alkaline ferrocyanide etched molybdenum samples are shown, left to right: cold-pressed, low temperature sintered; slip-cast, low temperature sintered; hot-pressed; ball sintered. 200X.





PLASTER MOLD is formed by pouring a slurry of plaster around a metal or wooden shape. Form is easily withdrawn after plaster has been allowed to set.



MOLYBDENUM shapes start with pouring of slip into mold. Residual liquid is poured off, slip adheres to mold wall. Air dried crucibles show in front.

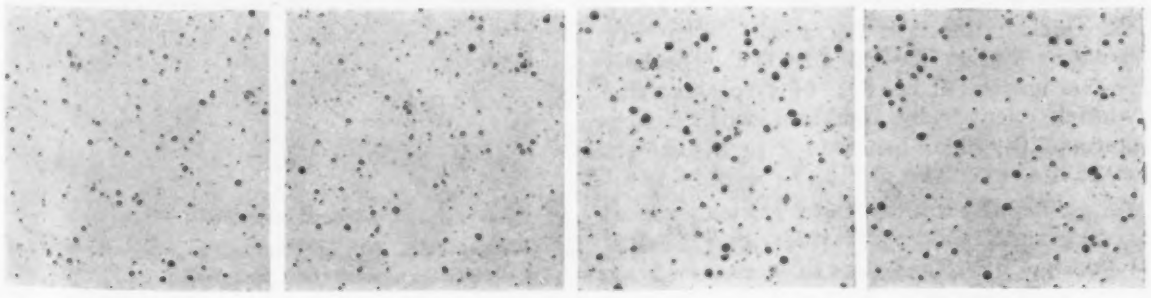
is withdrawn when the plaster has had time to set. The ceramic slip is poured into the plaster mold. The mold, when filled, is inverted and the liquid portion drained out leaving partly dried powder adhering to the walls and bottom. On air drying, the alumina or beryllia shape shrinks from the sides of the mold and is easily withdrawn and calcined to produce a dense shape.

A combination of experience in slip-casting ceramics and in general powder metallurgy operations suggested molybdenum shapes could be produced by the ship-casting technique. First attempts failed because the cast shape cracked as it started to dry in the plaster mold, and it appeared that there was no bond between the particles of metal powder such as is obtained in a ceramic slip. By experimenting, a technique was worked out which gave success nearly every time.

First step is preparation of the slip. Oversize molybdenum powder resulting from reduction of molybdic oxide was used in most experiments although it was later found fine powder was satisfactory. The oversize powder was +200 B.S.S. mesh. This was ball milled with steel balls for several days. By the end of this time a considerable amount of iron had been picked up from the mill and balls, and the molybdenum powder was washed with hydrochloric acid. Acid leaching of the molybdenum was not a departure from the normal slip-casting technique as applied to ceramics such as alumina or beryllia. Milled ceramics are also leached with acid and it is known the acid treatment not only removes the iron but insures a satisfactory slip.

The milled molybdenum was leached with a 10 pct, volume for volume, solution of hydrochloric acid followed by successive leachings with 5, 2½ and 1 pct solutions. The residual acid was not removed and appeared to be essential for successful operation. Work indicated the residual

UNETCHED molybdenum structure, left to right: cold-pressed, low temperature sintered; slip-cast, low temperature sintered; hot-pressed; bell sinterd. 100X.



acid content could be reduced further. But while slip at pH3 gave success there was a much greater chance of failure when the acid value was reduced below this figure. The value of the residual acid in the slip is very important. Also acid content at pH3 is preferred to avoid acid attack on the plaster mold.

The new technique has been applied mainly to the production of hollow ware such as crucibles. The slip, freshly prepared to avoid aging effects, is poured into a plaster mold prepared by casting a plaster slurry round a polished brass shape. Pouring continues until the mold is over-full to allow for trimming after drying. The mold should not be too dry or too wet. Certain reagents added to the plaster improve its properties. Addition of up to 2 pct borax has been found beneficial.

As soon as the slip is poured into the mold the plaster starts draining the water from it and the operator must judge the correct moment to tilt the mold containing the slip and pour out the residual liquid. The drained slip adheres to the walls of the plaster mold forming a crucible shape. Molds are air dried and the slip-cast molybdenum detaches itself from the walls and can be removed by inverting over the hand. The shapes are fragile and require care in handling.

Drying must be done carefully. For larger shapes several days are required at temperatures from 60° to 110°C. Dried castings are fairly strong and can be transferred to an electric furnace where the temperature is gradually increased to 1700°C. Heating is continued for about 2 hr in a hydrogen atmosphere. Typical density figures are 9.3 and 9.4 compared to 9.45 usually only obtained by bell sintering. Theoretical density of molybdenum is 10.3. The sintered metal has a dull gray appearance but by machining or abrasion an excellent finish can be obtained.

While there is no large immediate application for slip-cast molybdenum, there is no reason why the method should not be applied to other metal powders. Further, solid shapes could be produced in this manner.

Densities obtained by slip casting and sintering were as good as those obtained by cold-pressing and sintering at the same temperature, and similar to results obtained with some ceramics.

Hot-pressed in carbon mold

Hot-pressing of molybdenum was also suggested by experience in allied techniques. In production of dies mixed tungsten carbide-cobalt powders are heated under pressure. Temperature required for hot-pressing hard metal is about 1400°C and the only satisfactory die material for operating at this temperature is carbon.

There is no disadvantage in using carbon for hot-pressing hard metal as the tungsten is already present as a carbide and cobalt does not form a carbide under such conditions. However, most metals form carbides when heated to high temperatures in contact with carbon. Molybdenum is no exception, but as the hot-pressing operation takes little time it was hoped only slight carburization would take place.

Molybdenum is hot-pressed in a carbon mold heated by a high frequency induction furnace. Molybdenum powder is placed in the mold, the plunger inserted and loaded, and heat applied. Pressure used is 500 to 600 psi. Temperature is raised gradually. At 700°C sintering commences, and at 850°C is quite rapid. A temperature of 1500°C is necessary to obtain maximum density.

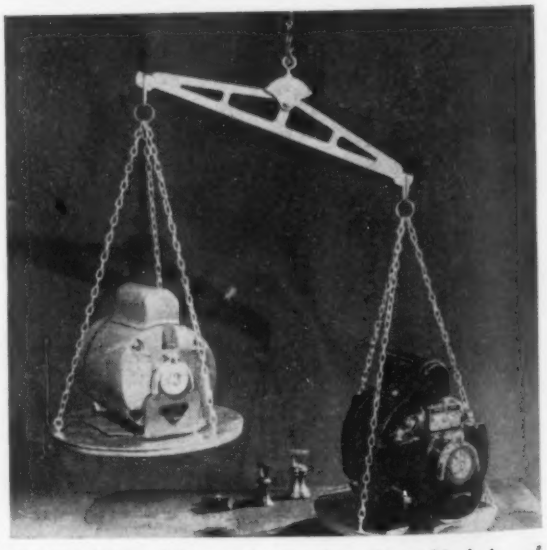
New motors are SMALLER, LIGHTER

A line of fractional horsepower motors embodying a new concept of motor design and manufacture has been announced by the General Electric Co. Fhp motors have hundreds of applications on pumps, fans, blowers, compressors, office and home appliances, etc.

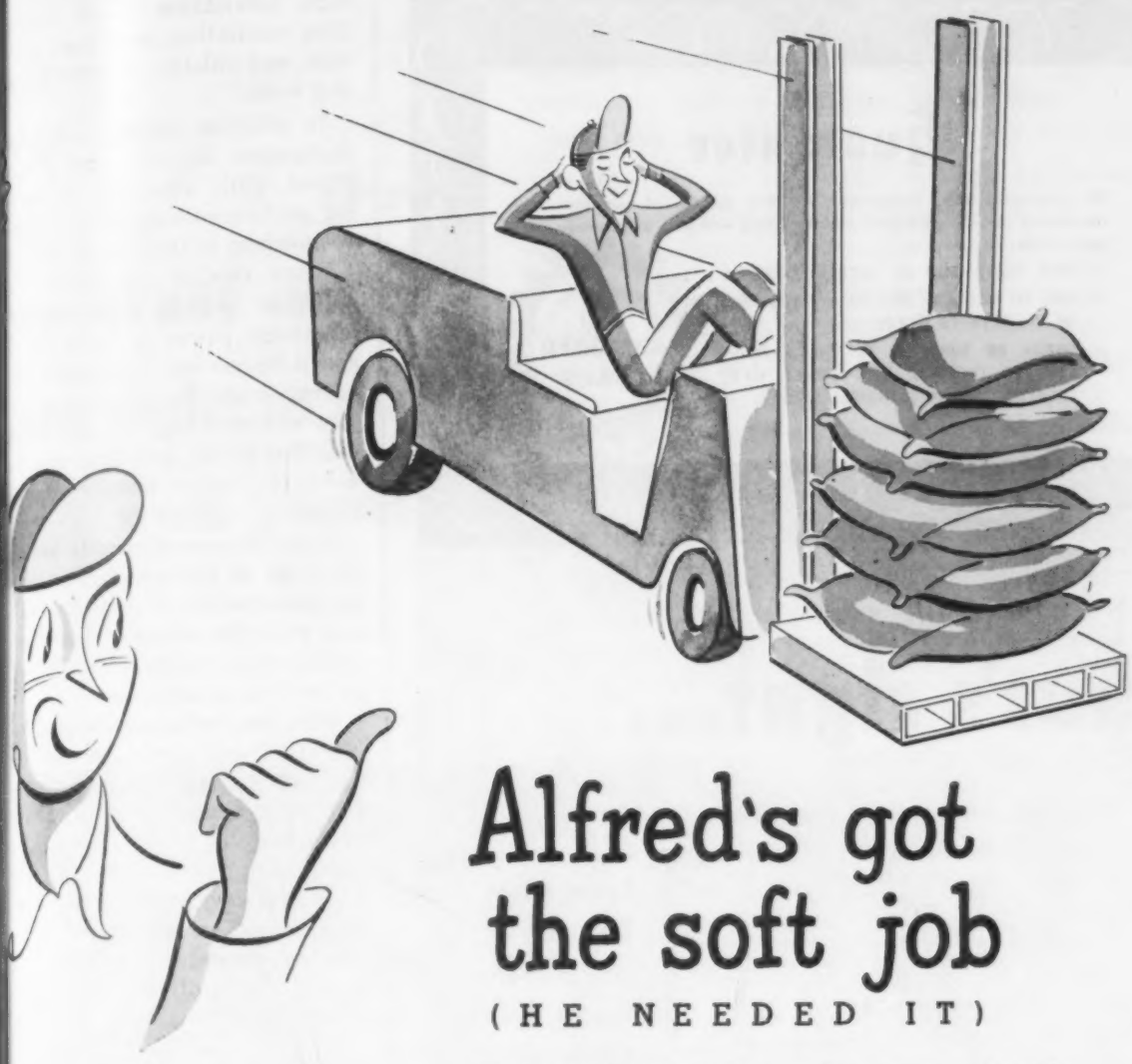
The new motors weigh as much as 51 pct less per horsepower than ordinary fhp motors, and are considerably smaller in size. At the same time, the versatility of application has been broadened and appearance modernized.

The design incorporates a completely new insulation system developed by G.E. especially for this project. It consists of a special nylon material scientifically combined with Formex wire and Glyptal varnish to give the motors longer life.

The line also makes more efficient use of existing materials, and features a long list of new design features. Among these are new bear-



NEW MOTOR, left, weighs far less than old design of equivalent horsepower. It is also smaller.



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ings, lubrication system, insulation, ventilation, mountings, windings, end shields, terminal board, and leads.

In addition, the new motors are engineered for dissipation of heat losses while retaining outstanding performance characteristics in comparison to their small size.

Being smaller and lighter, the new line permits installation of maximum power in minimum space. Its use also decreases transportation and storage costs on motors and motorized devices, makes handling easier, and eliminates the need for heavy mounts on machines.

Open drip-proof models are as much as 48 per cent lighter than previous motors of equivalent rating, while the totally enclosed fan-cooled types weigh less than half as much in some cases.

With the improved bearings, lubrication, and insulation, the new line of general purpose sleeve-bearing motors offers a wider range of application. It will eliminate, in many instances, the extra expense of special enclosures or ball bearings. It is the only motor of its type recommended for all-angle operation. It conforms fully to all NEMA specifications.

Dust Filter:

Tough dust control problem bows to continuous cleaning system.

A tough dust control problem at the Coated Abrasives Div. of Minnesota Mining & Mfg. Co., St. Paul, Minn., has been solved in record time with installation of an automatic continuous cloth tube filter system.

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Meets Requirements — The system, in constant operation for the past 12 months, has met rigid requirements. It is keeping the plant clean while reducing maintenance.

Turn Page

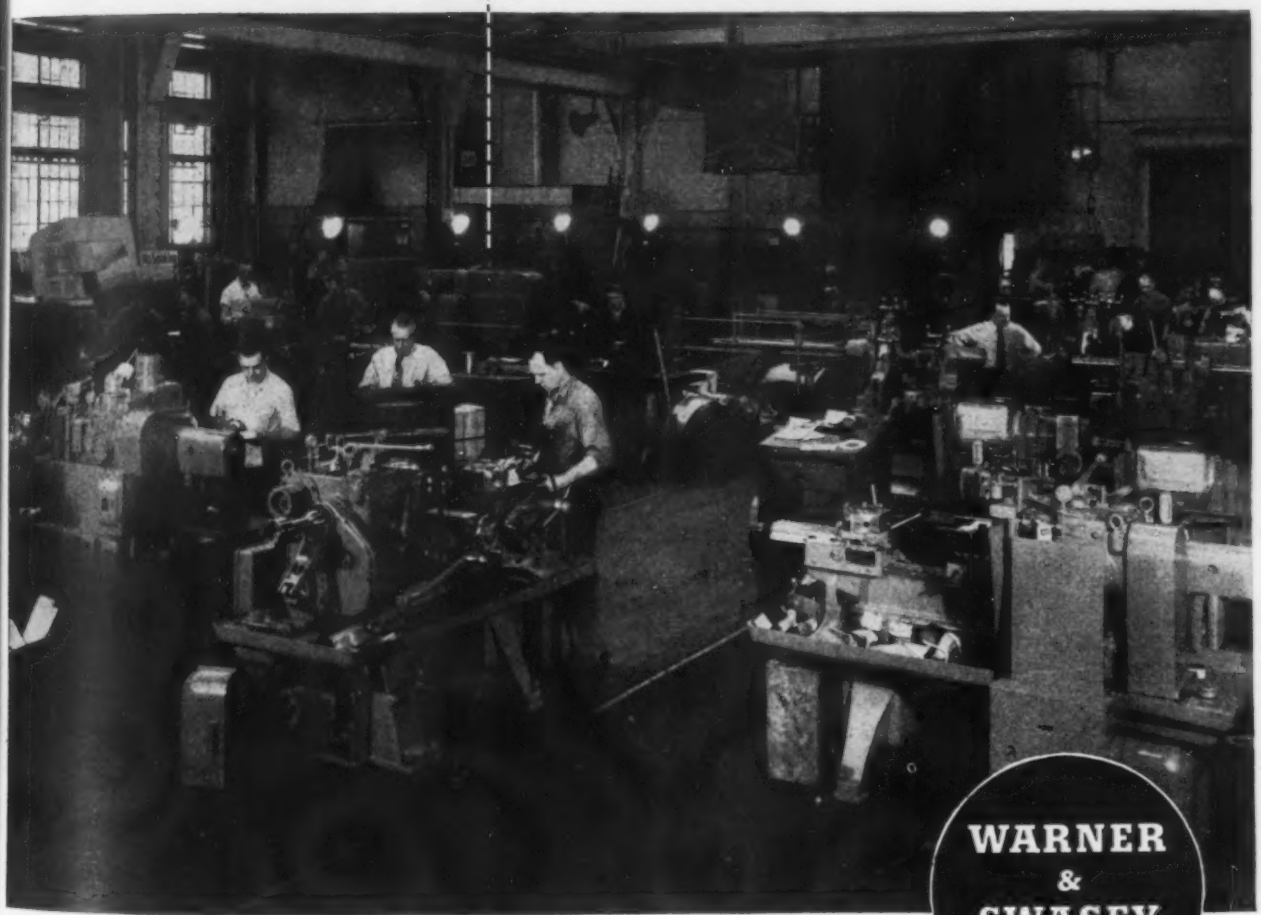
Our severest critics are right in our own plant!

● Contrasting with the constant pressure for production in other departments at Warner & Swasey is the calm, methodical work of one group of our men. These men are our severest critics—our final inspectors.

By the time an assembled turret lathe reaches one of these final inspectors, its individual parts have already passed 15,000 inspections!

But that is not enough! The final inspector carefully rechecks the completed machine—*proves* beyond doubt that it is ready to turn out the high precision work for which it is designed. Only then does he *sign his name* to a written report certifying that the turret lathe he passes is as perfect as human skill can make it.

Like our other departments, "final inspection" is working day and night to get machine tools to our shipping platform on schedule. But despite stepped-up production and urgent delivery dates, *no* machine leaves our plant until it meets the long-established Warner & Swasey standards for accuracy and dependability.



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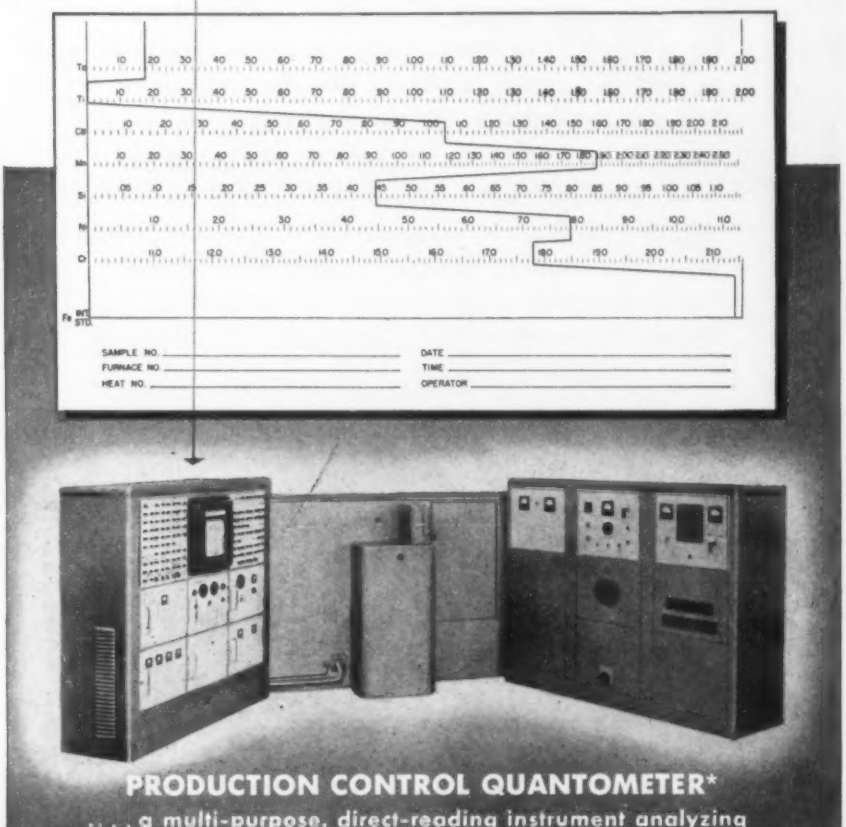
THE INSIDE STORY ON STAINLESS STEEL

Shown below is a multiple-copy graphic record of a typical stainless steel chemical analysis made on an ARL Production Control Quantometer.* Accurate percentages of elements present in the alloy are recorded permanently in pen-and-ink in less than two minutes! And steel is only one of many metals and inorganic compounds which the unique ARL Quantometers are controlling daily as to routine chemical analysis in many types of industries.



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. . . . a multi-purpose, direct-reading instrument analyzing metals and other inorganic materials

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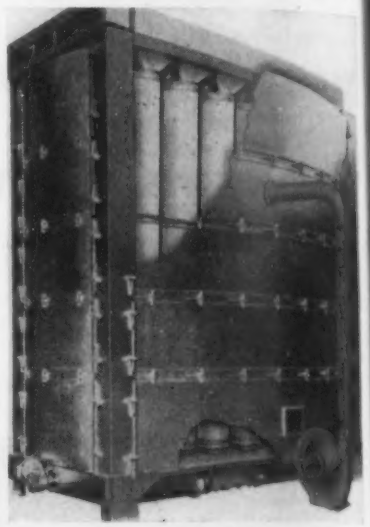
Efficient, low-cost recovery of various abrasive materials demands filters of extremely high filtering ability. Filters used at the 3M plant to snatch fine abrasive dust particles from the air are reported to show up to 99 pct filtering efficiency in tests.

Filtering Felt Used—The unit uses a high grade filtering felt. Reverse jet rings traveling up and down the cloth tubes clean them continuously and thoroughly. Cleaning action is gentle, however, eliminating wear of the filtering cloth.



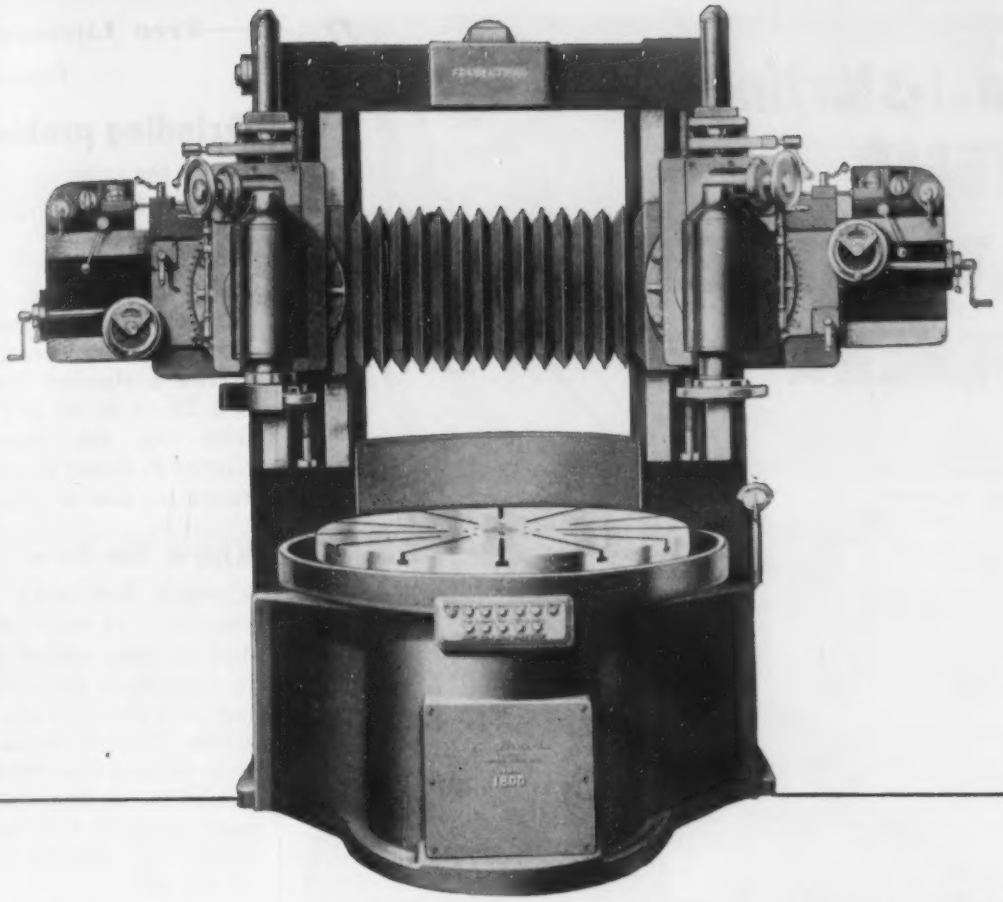
DUST FILTER is shown with metal housing cut away to reveal filtering tubes.

The cleaning operation eliminates shutdowns for filter cloth cleaning. Plant housekeeping has been simplified. The resulting cleaner plant has boosted employee morale. Production has increased and maintenance costs are lower.

Grinding Bibliography Revised

Faced with the growing diamond bort shortage, manufacturers can solve part of their grinding wheel problem by better use of the wheels they already have. Much published information is available on the subject.

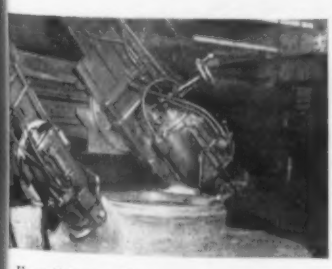
The extensive bibliography on truing of grinding wheels, covering from 1910 to June 1951, has been revised by the Industrial Diamonds Information Bureau, Industrial Distributors (Sales) Ltd., 32-34 Holborn Viaduct, London, E. C. 1.



Announcing the new 30" to 48"

FRAUENTHAL MULTIPLE-HEAD CYLINDRICAL SUPER-PRECISION GRINDERS

Here is a welcome addition to the line of big Frauenthal Grinders. It's the new 30" to 48", Series 1800 Grinder... smaller brother of the world's largest super-precision 140-inch Frauenthal Grinder . . . ideal for you manufacturers whose grinding requirements can be handled within a maximum 56-inch swing on a 30" to 48" table. This latest Frauenthal Grinder does the same close tolerance grinding of .0002" which made its big 140-inch brother famous. Grinds diameters and parallelism of faces on large precision parts to unusual accuracy of related parts. For uniform precision results on a dependable production basis, investigate Frauenthal Grinders.



Unequalled versatility...many unique set-up combinations of Grinding-Spindle positions. The above production photo shows simultaneous grinding of both raceways of big Biangular-type precision roller bearings with Frauenthal Grinder.

IN 10 STANDARD SIZES • ALL SIZES MADE TO ESSENTIAL J. I. C. SPECIFICATIONS

	SERIES 1800				SERIES 2000		SERIES 2200			
TABLE SIZES	30"	36"	42"	48"	60"	72"	100"	120"	130"	140"
MAXIMUM SWING	56"	56"	56"	56"	72"	88"	120"	130"	140"	150"

Ask for Bulletin

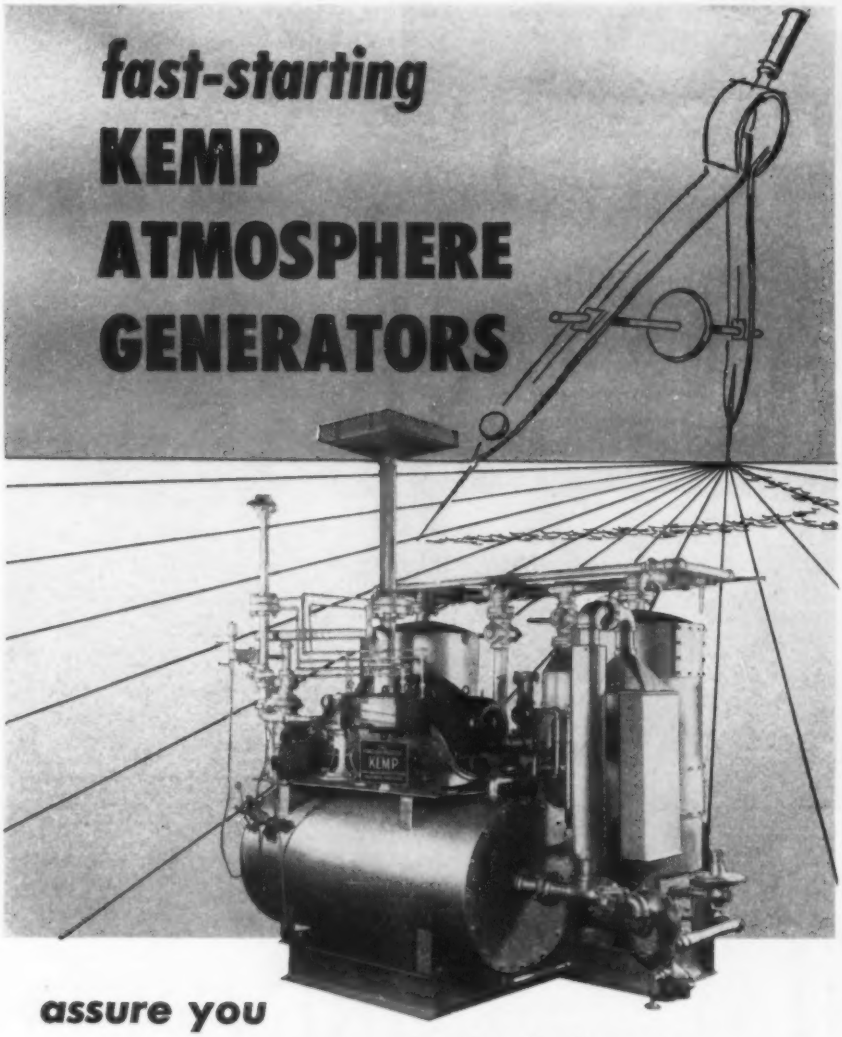
A. HAROLD FRAUENTHAL

INCORPORATED

930 WEST SHERMAN BOULEVARD • MUSKEGON, MICHIGAN

★ GRIND OUTSIDE • INSIDE • and FACES SIMULTANEOUSLY ★

fast-starting KEMP ATMOSPHERE GENERATORS



assure you exact same analysis inert gas regardless of demand

PERFORMANCE reports from Kemp users throughout the metals field show: Kemp Atmosphere Generators produce and maintain *exact analysis* of chemically clean protective atmosphere gas *regardless* of demand. Eliminate the possibility of mixture fluctuations at some critical phase of processing . . . offer *big* gas and maintenance savings. And in addition, each Kemp Generator is engineered for fast starting, easy operation so as to save you both *time* and *money* spent on the warm-up periods. You can't go wrong when you specify Kemp.

Set it . . . forget it!

The Kemp Industrial Carburetor, standard equipment and the very heart of every Kemp installation, assures you complete combustion . . . without tinkering . . . without waste. Uses ordinary gas right from mains. Every Kemp Design includes complete up-to-the-minute fire checks and safety devices.

Why not find out how Kemp can help you with your problems, save you money, today?

KEMP OF BALTIMORE

GAS GENERATORS

Write for Bulletin I-10 for technical information

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CARBURETORS • BURNERS • FIRE CHECKS • ATMOSPHERE & INERT GAS GENERATORS
ADSORPTIVE DRYERS • METAL MELTING UNITS • SINGEING EQUIPMENT • SPECIAL EQUIPMENT

—Free Literature—

Continued

Grinding problems?

Here's the answer to your multiple grinding problems—the Grant universal grinder, sander and polisher. Described in a new leaflet, the Grant grinder was developed to meet the need for a more versatile grinding machine. The grinder carries a standard stock abrasive belt 2½ x 60 in. and is provided with two flat platen surfaces. *George F. Grant Co., Inc.*

For free copy insert No. 14 on postcard, p. 131.

Know the flow

Knowing how much fluid flows, whether it be water, sewage, or industrial plant effluent, is a big help in controlling processes and keeping costs down. A new bulletin describes Bristol's Series 500 line of open channel flow meters. Application of the instruments to measurement of liquid flow through weirs, flumes and channels is described. *Bristol Co.*

For free copy insert No. 15 on postcard, p. 131.

Stamping ground

Multi-stamping by Destaco means high speed production of small and intricate parts to close tolerances and in large volume. The functions of several separate punch presses are combined in one continuous automatic process. There is no handling from raw stock to finished part. Round and tubular parts are easily formed from flat stock. Close tolerances may be held in large volume and at low cost. *Detroit Stamping Co.*

For free copy insert No. 16 on postcard, p. 131.

What's a Silicone?

That's the title of a new Dow-Corning book giving the answer to the question a lot of people have been asking. They're compounds that keep radar from going blind on a foggy night. They're fluids that polish without rubbing. They're rubber that won't melt on hot aircraft engine cylinders or freeze at 100° below zero. And they're much more, depending on what your problem is. *Dow Corning Corp.*

For free copy insert No. 17 on postcard, p. 131.

NEW equipment

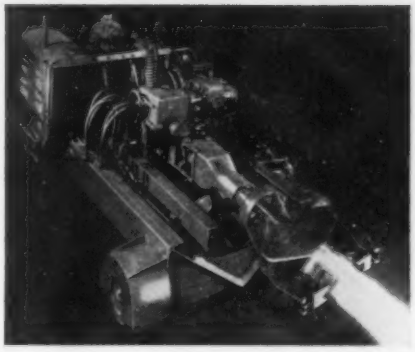
New and improved production ideas, equipment, services and methods described here offer production economies . . . fill in and mail postcard on page 131 or 132.

Rapid, multiple gaging of automotive crankshafts

This multiple gaging machine for 100 pct inspection of automotive crankshafts makes it possible to read simultaneously 34 or more dimensions at a glance by means of an Airechart. It checks main bearings for size and taper; pilot hole diameters; flange diameters and runout; thrust bearing faces; keyway locations, etc. Part to be gaged is placed in a loading cradle, and automatically lowered into gaging position where it is revolved on rolls to gage the concentricities and runouts. A hand type airsnap is used for gaging the crankpins for diameter and taper in three places simultaneously on the journal. All gaging anvil surfaces are tungsten carbide. Both instrument and gaging machine is basic and lend themselves to adaptation to almost any type of inspection on any crankshaft. *Sheffield Corp.*

For more data insert No. 18 on postcard, p. 131.

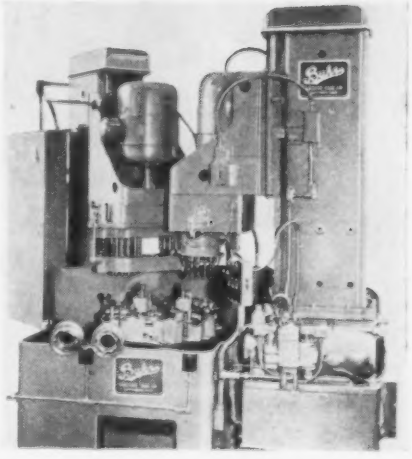
Manipulator handles hot stock during forging



Certainty of grip and maneuverability of hot stock during forging are assured with an auto-floor manipulator that features wedge action design in the work holding tongs mechanism and a positive-positioning feature in the tongs shoes. Machines handle forging stock from the beginning of the operation through to the end, including loading and drawing furnaces and manipulating the work while in the press. Rotating, tilting, vertical, and lateral motions of the workhead guarantee complete control of the work during forging. Machines range from 1 to 10 tons carrying capacity. *Salem-Brosius, Inc.*

For more data insert No. 19 on postcard, p. 131.

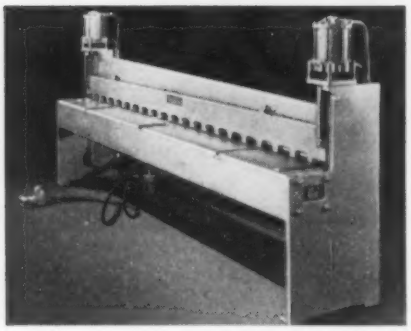
Drilling machine processes army tank parts



This special drilling and tapping machinery can be converted to other uses after it has completed its present job of processing army tank parts. A special feature of the machine is that both sides of the part are drilled and tapped in the same fixture, an operation accomplished by turning the part over after one side has been drilled and tapped. Two sets of locators are produced, with a single lever actuating both sets, lowering one set as it raises the other set into working position. This two-column combination drilling and tapping machine drills, chamfers and taps holes in each end of the tank part. Tooling consists of a 24-spindle drill head, a 12-spindle individual lead screw tapping head and one four-station fixture, mounted on a four-position automatic index table. *Buhr Machine Tool Co.*

For more data insert No. 20 on postcard, p. 131.

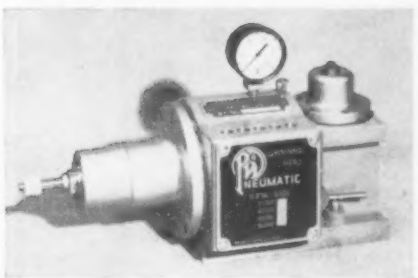
Turn Page



Air power squaring shears for sheet metal shop

Simplified construction of an economy line of squaring shears eliminates such parts as flywheels, gears, clutches, motors and electrical controls. Air from any system found in the average shop with pressures of 70 or 80 psi is all that is necessary. For shops without air, a small air compresor and surge tank will suffice. Foot valve automatically clamps the holddown and lowers the crosshead to complete a cut. Releasing the treadle instantly returns them to top position. All main components are formed from welded steel plate. *Niagara Machine & Tool Works.*

For more data insert No. 21 on postcard, p. 131.



Internal grinding spindles have wide speed range

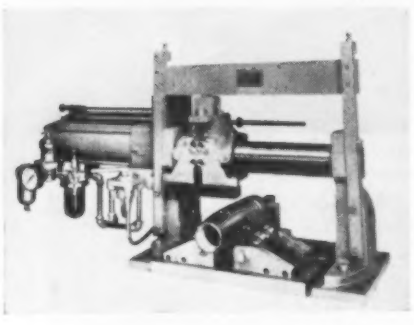
A new high speed pneumatic grinding head features characteristics said to surmount difficulties associated with high speed spindles and reduce the skill required to produce ultimate results in hole accuracy and finish. Two units cover speeds from 35,000 to 100,000 rpm. This range provides efficient cutting speed (5000 sfm) for grinding wheels or points ranging from 5/32 to ¾ in. diam. Heads operate from an air supply providing approximately 25 cfm at 80 to 100 psi. *Pratt & Whitney.*

For more data insert No. 22 on postcard, p. 131.

Shorty grinder fits hand comfortably

Pneumatic grinders designed for production grinding and finishing operations are compact, easy to handle, accurate, and powerful for their size and weight. Exhaust directs air away from the operator toward the wheel to cool and clean the work. Noise silencer eliminates high pitch tones present in most air tools. The tool is equipped with Erickson precision collets, and has a maximum 0.0015 in. arbor runout to insure finest accuracy. Weight is 18 oz; overall length 5¼ in. A pneumatic die grinder is a heavy duty tool for extreme accuracy on large, tough grinding jobs. It is small and compact, has adjustable speeds. *Mall Tool Co.*

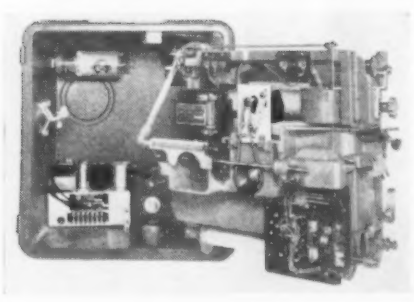
For more data insert No. 23 on postcard, p. 131.



Improved shell marker has increased capacity

Fifty percent increase in the amount of marking on each shell is claimed for a new shell marker. An overhead, horizontal bar has been added to the workhead of the machine against which a precision ball bearing rolls to relieve pressure on the slide marking head. Marking head holder has been enlarged and provided with set-screw adjustment for greater marking capacity. An adjustable stop is provided for positioning the mark. Machine operates from standard air line. Speed of operation when marking 75 mm shells is up to 20 marked shells per min. *Acromark Co.*

For more data insert No. 24 on postcard, p. 131.



Kit converts pyrometers to electronic operation

A kit containing all parts necessary converts pyrometers from mechanical to full electronic operation. Installation can be done by an inexperienced operator in 4 hr. All that's needed is screwdriver, soldering iron and pliers. Repair and maintenance are as easy. The converter will fit most popular makes and gives the same stable, dependable performance of a factory built recorder. Full range scanning is possible in 1½ sec. Converter can be used in strip and round chart recorders. *Pyrometer Service Co.*

For more data insert No. 25 on postcard, p. 131.

Surface broach

A 72-in. stroke, 15-ton vertical hydraulic surface broaching machine conforms to J.I.C. standards. New type fixed hydraulic cylinder operates the work slide which is guided in adjustable hardened and ground ways. Ways have a larger cross section, providing a more accurate and longer wearing machine slide. SB-72-15 model has a receding work table and an automatic indexing unit to broach 95 Xmas Tree form slots in turbine wheels. The machine is also available with 90 and 120-in. stroke. *American Broach & Machine Co.*

For more data insert No. 26 on postcard, p. 131.

Live roller conveyer

Live roller conveyer is manufactured in widths from 6 to 36 in. Rollers are 2-in. diam and spaced to meet customer's requirements. Rolls are driven by belt passing underneath and touching each roller above. Standard speed is 50 fpm; variable speeds are also available. *Sage Equipment Co.*

For more data insert No. 27 on postcard, p. 131.

Utility bench

A low-cost utility bench has a heavily-ribbed 24x36-in. cast iron top supported by four sturdily braced steel legs. It is light weight, rugged in construction. For general utility purposes, bench is 36 in. high; 30 in. high as a nailing table. *Challenge Machinery Co.*

For more data insert No. 28 on postcard, p. 131.

Turn Page

LOW CARBON • HIGH CARBON • ALLOY • STAINLESS • STRIP AND TUBING

UNIFORM HIGH QUALITY *Demands* MODERN EQUIPMENT

Production of steel strip and tubing to meet modern industry's rigid specifications demands the most modern equipment. During the last 30 years, The Wallingford Steel Co. has kept pace with developments in both machinery and techniques by sponsoring a continuous program of replacement and improvement. Today, not one piece of original equipment is still in use. The two-stand, four-high tandem rolling mill shown above is an outstanding example of the many precision built production machines in our completely equipped plant. Electrolimit continuous mill gages provide a constant check in holding sheets to extremely close tolerance.

THE WALLINGFORD STEEL CO.

SINCE 1922

WALLINGFORD, CONNECTICUT, U.S.A.

READ HOW YOU CAN CUT COSTS . . . SAVE MAN-HOURS WITH NOX-RUST'S NEW PATENTED VAPOR-WRAPPER METHOD OF RUST-PREVENTION

VAPOR-WRAPPER stops rust without oil or grease. This new paper contains a patented chemical that prevents corrosion. With Vapor-Wrapper, there's no greasing or de-greasing. You save time, man-hours and money when you switch to this better method of rust-prevention.

CAN YOU BENEFIT FROM THIS SALES ADVANTAGE?

Vapor-Wrapper delivers parts "factory-fresh"... ready for use. Your customers benefit . . . and you gain a real sales advantage with Nox-Rust Vapor-Wrapper. Find out for yourself. Get full details without obligation. Use the handy coupon below.

CAUTION... Only Nox-Rust makes the exclusive new Vapor-Wrapper that's impregnated with Cellex... the patented VOLATILE CORROSION INHIBITOR. (U. S. Patents 2,521,311—2,534,201 —other patents pending).

Just Mail This Coupon (Please attach to your letterhead)

NOX-RUST
CHEMICAL CORPORATION
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Detroit • Baltimore • Philadelphia
San Francisco • Los Angeles

NOX-RUST Chemical Corporation
2445 South Halsted • Chicago 8, Illinois
Please send me full information on how my firm can benefit through use of Vapor-Wrapper.

Your Name_____

Address_____
(If different from letterhead)

City_____ State_____

—New Equipment—

Continued

Light-duty fork truck

For service in cramped spaces and where floor load capacity is limited, the Spacemaker J Model electric fork truck provides light-duty operation, at half the usual cost. It is manufactured with heavy duty components, has stamina to give long periods of efficient, full-power service, but has slightly less travel and lifting speed. *Lewis-Shepard Products, Inc.*

For more data insert No. 29 on postcard, p. 131.

Shatterproof carboy

Bulk quantities of poisonous or corrosive acids and other caustic material can be safely transported in smash-proof carboys, equipped with large unbreakable, bouncing plastic bottles. Carboys are round; have capacities of 6½ and 13 gal. Bottles are blow-molded in one piece, of flexible polythene. These Plaxpak containers withstand sub-zero temperatures and high altitudes. Walls of the bottle flex and expand but will not crack if contents freeze. Flexibility allows it to adjust to stresses imposed by unequal atmospheric pressures. *Plax Corp.*

For more data insert No. 30 on postcard, p. 131.

Layout paper

Reduction in layout time and increased accuracy on types of layout and design requiring full-sized paper patterns can be gained through use of square-up layout paper. Heavy, Kraft-type paper is imprinted with dotted lines indicating 6 and 1-in. squares. Small dots permit measurements to 1-in. increments. *Barrows Porcelain Enamel Co.*

For more data insert No. 31 on postcard, p. 131.

Milling cutters

Shanks of the blades of new Universal Line cutters are round. Round holes for the blade and Super-Jack blade locking wedge overlap radially on center in the alloy steel body and provide space for up to 4 times as many blades as the cutter diameter if extremely fine pitch is desired. A groove in the blade shank engages a tongue in each blade slot in the body, assuring accurate positioning of the blade shank on center. Any Universal body can be used for any cutting requirement including right or left hand rotation; with carbide or high speed blades, using positive or negative angles. *McCrosky Tool Corp.*

For more data insert No. 32 on postcard, p. 131.

New triple-feature

Insulation with silicone is first of three new features in a line of ac welders. Use of this semi-organic insulating material provides greater overload capabilities, permits more compact, lighter weight design, and prolongs welder life. Second is combination of low open circuit voltage with arc stabilization resulting in smoother performance and elimination of pop-outs. Third feature is automatic hot-start which makes arc striking easy. Welder line is made of 200, 300, 400 and 500 amp. *Metal & Thermit Corp.*

For more data insert No. 33 on postcard, p. 131.

Turn Page

"MULTICUT" "TUFCUT" "HOT WORK"

Wapakoneta

SHEAR BLADES and ROTARY KNIVES

Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.

Rx ENGINEERED TO THE JOB

Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.

The WAPAKONETA MACHINE CO.

Shear Blade Specialists Since 1891

Wapakoneta, Ohio

41 SECONDS
for a 2 corner cabinet *with a* BATH TANGENT BENDER

Exclusive *open throat design* of the **BATH TANGENT BENDER** assures continuous high speed production of metal cabinets, cases and housings. **Flanged** sheets can be shaped to produce cabinets having two or more radius corners. Crown, corners and sides are formed in **single cycle of operations.**

BATH TANGENT BENDER features automatic positioning of metal to be formed and close control throughout the entire process. *Result is volume production of uniform shapes without work wrinkles or deformation.*

BATH TANGENT BENDER can accommodate radius corners from 5/8 to 5 inches. As it forms the shape, it can perform any slitting, piercing, stamping or cutting operation within its 17-ton capacity.

469-CY

CB THE CYRIL BATH COMPANY

6948 Machinery Avenue • Cleveland 3, Ohio

—New Equipment—

Continued

Precision work

Vertical milling machine manufactured by Technica of Switzerland is designed for serial milling of grooves, slits, slashings, joint-seats, etc. It should be of interest to instrument makers and apparatus builders requiring exact and clean workmanship on small parts. Spindle capacity is 5/16 in.; maximum speed, 6000 rpm. Five-inch diameter milling table has transverse movement of 1 9/16 in.; longitudinal movement of 2 in. *Carl Hirschmann Co.*

For more data insert No. 34 on postcard, p. 131.

Horning press

Positive alignment with 5¼ in. die space, 12 ton capacity and narrow bed are combined in a new horning press to permit horning or flange notching operations on workpieces or assemblies after forming or assembly. The manufacturer claims that punch and die alignment accurate to 0.0001 in. is obtained in the press. Notching is permissible in any direction without heels on the punches. *Leslie Welding Co.*

For more data insert No. 35 on postcard, p. 131.

Vacuum pump

Electric driven vacuum pump maintains required pressure differential for camera operation in aircraft. Oil-less operation to two sliding blades in rotor slots assures free movement at sub-zero temperature. Starts cold with no sticking or jamming at −65° F. Pump is rotary vane type. Motor is 1 hp, 400 cycle, 200 v, 3 phase. *Lear, Inc. Romec Div.*

For more data insert No. 36 on postcard, p. 131.

Heavy inner tubes

New extra heavy pneumatic inner tubes for tires on mine shuttle cars are made of butyl rubber and built almost twice as thick as conventional tubes used in this service. They are manufactured in three sizes, 7.00-15; 7.50-15; and 8.25-15. A special valve cap can be taken on or off only with a small key. Barring injury to the tire or tube, it is believed the new tubes will hold their recommended air pressures from 1 year to 18 months with only minor reduction in air pressure. *B. F. Goodrich Co.*

For more data insert No. 37 on postcard, p. 131.

Conveyer belt trainer

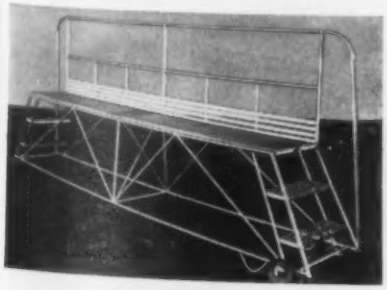
A positive-action belt trainer automatically keeps wandering conveyer belts aligned, eliminating wear, downtime, and excessive maintenance costs. The trainer can be installed on any make conveyer which has the return belt exposed beneath the bed. It is designed for use on fabric or rubber-covered belts 3/16 in. or more thick, operating at speeds to 200 fpm. *Rapids-Standard Co.*

For more data insert No. 38 on postcard, p. 131.

Safe footing

All-steel welded tubing, expanded metal treads and platform provide safe footing and ample space for tools and workers on portable platforms, built for assembling large machinery and machine tools, army tank turrets, guns, for aircraft production, etc. Platforms are built to order to meet specific requirements for length, height, width and rail construction. *Ballymore Co.*

For more data insert No. 39 on postcard, p. 131.



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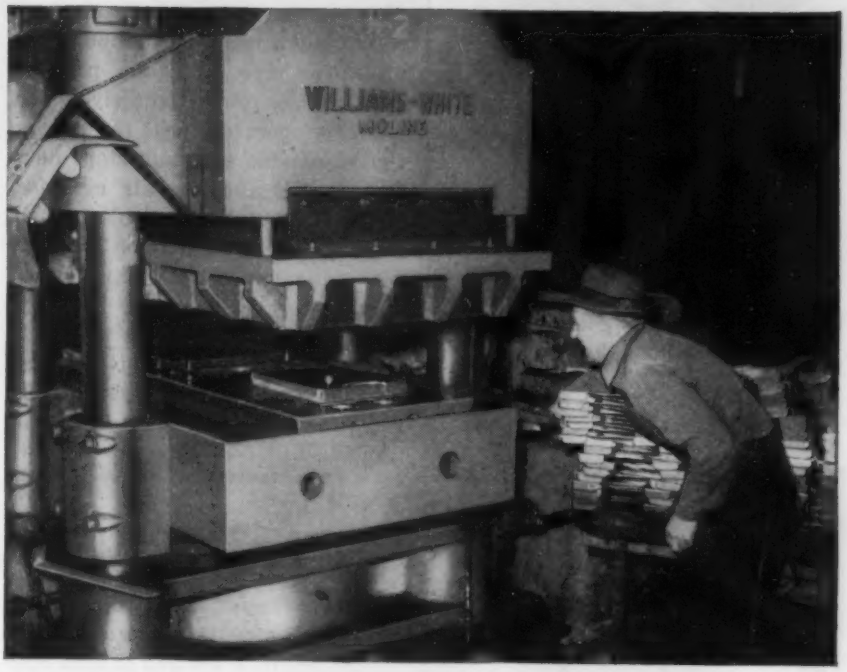
WILLIAMS-WHITE PRESS SPEEDS STOVE PRODUCTION



WILLIAMS-WHITE 600-Ton Hydraulic Press forming broiler pan racks for electric ranges. Inexpensive, lightweight and quickly made Masonite dies are used as forming blocks to make possible short runs or quick changes in design.

Whatever your production plans may be, there is a WILLIAMS-WHITE custom designed machine to help you do the job better, faster and more economically. Presses, shears, punches, rolls, benders, hammers or bulldozers . . . designed and built to meet your specifications.

Write for Free Catalog of typical production machines

Remember . . . Getting in the Scrap today means more Steel Tomorrow!

MAKERS OF QUALITY PRODUCTION TOOLS FOR NEARLY 100 YEARS

WILLIAMS-WHITE & CO.
MOLINE, ILLINOIS

an ACCO product WIRE

ROUND
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SHAPED

PAGE
makes them all...

LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

YOU draw the Shape
—Page can draw the Wire

Tell us the way *you* want it. We'll follow *your* specifications.

Cross-sectional areas up to .250" square; widths up to ⅜"; width-to-thickness ratio not to exceed 6 to 1.

Wire or Write Today

PAGE WIRE

ACCO

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

—New Equipment—

Continued

Pipe cut-off machine

Cutting pipe and tubing up to 12 in. diam can be accomplished automatically. A new machine cuts 60 pieces of 12-in. pipe and tube per hr; smaller sizes proportionately faster. Machine operator feeds the pipe to the adjustable set stop, steps on a foot switch and the air cylinder, precision electrical controls and air mechanism gage the speed at which the blade approaches pipe. When foot switch is actuated, the pipe starts spinning slowly as the blade engages it, then heavy cutting pressure is exerted. It automatically retracts the blade after each cut. *Continental Machine Co.*

For more data insert No. 40 on postcard, p. 131.

Floor painting

Concrete floor painting is said to be faster, easier and is done without stooping, using a new Jiffy tool. It consists of a wedged shaped rubber pad 20 in. long x 4½ in. wide, operated with a 54-in. handle in push-broom fashion. Paint is poured directly on the concrete floor and the paint tool spreads it in a thin layer. *Mico Products Co.*

For more data insert No. 41 on postcard, p. 131.

Stainless fog nozzles

All-stainless steel fixed installation fog nozzles for industrial processing and fire protection are smaller in size and lighter weight than previous models. Nozzles employ spiral principle of atomization. Non-clogging performance is claimed. Six models, three flow rates, and full or hollow cone fog pattern are available. *Bete Fog Nozzle, Inc.*

For more data insert No. 42 on postcard, p. 131.

Choker sling fitting

A choker sling fitting employs two overlapping and coacting hooks which are easily applied to a wire rope to form a loop of any desired size. The rope cannot be freed from the sling until both hooks are disengaged manually thus preventing accidental release. Pivoted hooks allow the unit to conform automatically to the size of the load. *Electroline Co.*

For more data insert No. 43 on postcard, p. 131

The BROOKS SERVICE ENGINEER

will keep you up-to-date on the Advanced Ideas of

WATER TREATMENT SERVICE

In the United States and Canada there are upwards of half-million plants, institutions and buildings which require Water Treatment or Water Conditioning Services. Brooks services every type of water problem, and through these services has developed varied formulas and methods which sharply reduce operating and maintenance costs while improving efficiency. Brooks Service Engineers are available anytime, anywhere for consultation without obligation to advise how you can solve your particular water problems.

Write for This New Bulletin and Other Technical Data

. . Fuel Oil Treatments

Both our laboratory tests and field use prove that these formulas keep tanks and supply lines clean and moisture-free; eliminate carbon on injection nozzles and upper heads; keep exhaust ports open; and add months between overhauls.

BROOKS Chemicals, Incorporated

3304 East 87th St. Cleveland, Ohio
Plants at CLEVELAND, OHIO and HAMILTON, ONTARIO
Offices in Principal Industrial Cities

QUALITY SERVICE THROUGH SCIENTIFIC RESEARCH

Big Furnace:

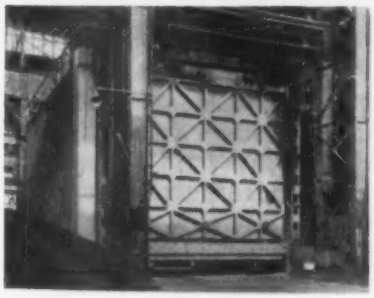
Stress-relieving furnace able to handle big weldments.

A giant stress relieving furnace has just been installed at Baldwin-Lima-Hamilton Corp.'s Eddystone plant to handle massive weldments for hydraulic presses and turbines.

The 22,760 cu ft recirculated-air, convection type unit, built by Industrial Power Equipment Co., is more than 60 ft long, 22 ft wide, and 17 ft high.

Controlled Heat—Indirect fired through three combustion chamber controlled temperature potentiometers, the furnace is also equipped with complete program control. Rate of heating, length of soaking time and rate of cooling are all set at the control board when the heat is begun.

Each chamber has a high-temperature recirculating fan that that pulls the gases from the furnace and forces them through the chamber for reheating. This eliminates fan burn-out since fan temperature does not exceed that of the furnace.



STRESS RELIEVING furnace installed at Baldwin-Lima-Hamilton's Eddystone plant will handle massive weldments for hydraulic presses, turbines.

Thermocouples—The furnace is equipped with 13 thermocouples for measuring the temperature of the piece being treated. They remain attached to the piece when the car is withdrawn from the furnace, the leads being connected to their instrument through a polarity plug on the car. On the first trial run, the furnace instruments recorded temperature differentials of only 5°F on a 70-ton charge, which varied from 8 to 3 in. in thickness.

WHY NOT cast a magnesium mousetrap?

Maybe it IS a lousy idea . . .

On the other hand, maybe it's as practical as using cheese for bait.

Frankly, we haven't gotten out a slide rule or put our thinking cap on tight, to figure it out one way or the other. Maybe the mice wouldn't go for it.

But we do know a lot of things WILL be cast in magnesium or aluminum after military requirements are satisfied.

A lot of things no one ever thought would be.

So whatever your plans are; whatever directions they might take; whatever products you might have on scraps of paper, in preliminary drawings, or just plain ideas-on-the-brain . . . . keep an open mind in terms of magnesium or aluminum in sand-cast, semi-permanent or permanent mold form.

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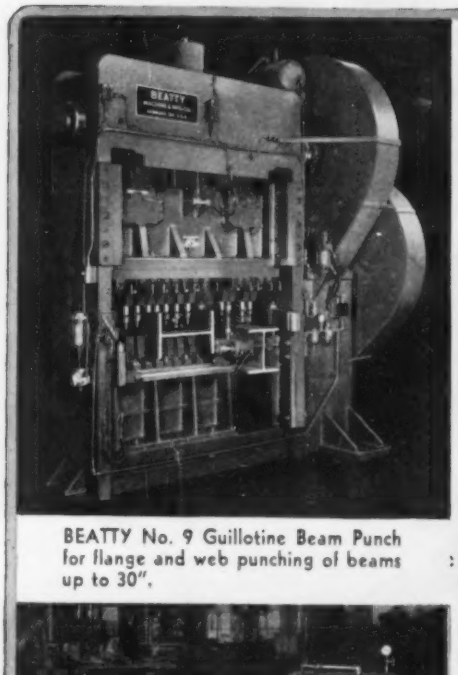
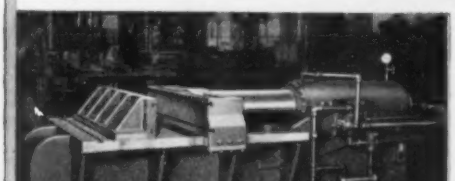
SIX HEAVY METAL WORKING PROBLEMS

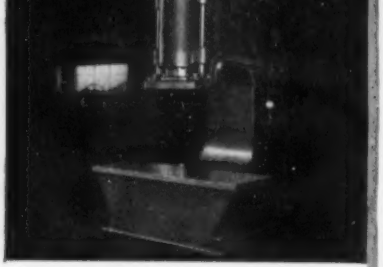


BEATTY No. 9 Guillotine Beam Punch for flange and web punching of beams up to 30".

BEATTY Guillotine Bar Shear for "short-order" shearing of flats, squares, rounds without changing tools.



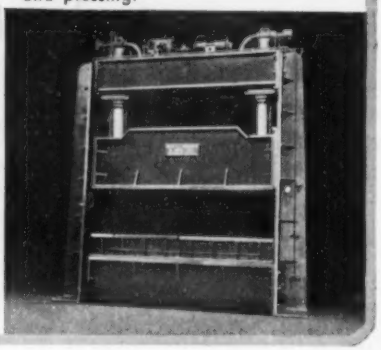
BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.



BEATTY 250-ton Gap Type Press for forming, bending, flanging and pressing.

Below: BEATTY 400-ton Hydraulic Vertical Bulldozer for heavy forming and pressing.

BEATTY Spacing Table handles flange and web punching of beams without roll adjustment.



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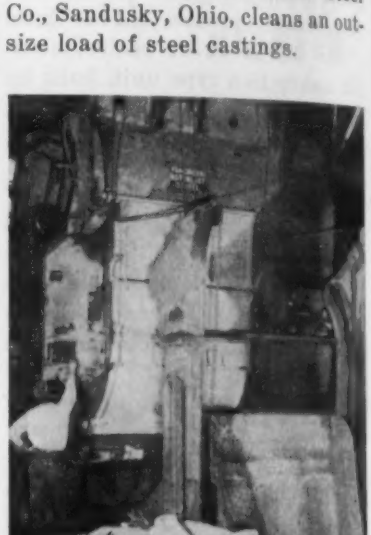
—Technical Briefs—

Blast Unit Cuts Cleaning Costs

A big, rocking barrel blast unit installed in a midwestern foundry permits one man to do the work of three. The 28-cu-ft Rotoblast barrel, made by Pangborn Corp., and installed at Farrell-Cheek Steel Co., Sandusky, Ohio, cleans an outsize load of steel castings.



BIG BLAST CLEANING barrel at midwestern foundry permits one man to do the work of three. Parts are automatically rolled under abrasive stream.

The unit blast cleans 500 tons of green work and 250 tons of annealed castings a month and saves Farrell-Cheek $144 a week. The unit cleans 1500 to 2000 lb of 40 to 600 lb castings at a time by automatically rolling them under a centrifugally hurled abrasive stream so that all surfaces are exposed to the cleaning jet.

Plan Metallurgy Courses

New developments in two phases of metallurgy will be reviewed in special courses to be given at the Massachusetts Institute of Technology during the summer of 1952.

A course in Surface Reactions in Flotation, to be given from June 9 to 13, will emphasize interpretation and coordination of recent data in the light of sound chemical principles. A special program in Chemistry and Mechanics of Molding Materials will be given from September 1 to 6.

Bismuth Analysis:

Method for determining content in lead-tin alloys developed.

A fast accurate spectrophotometric method for determining bismuth in lead or tin base alloys has been developed by the National Bureau of Standards. The method was sought to expedite testing of government purchases.

The sample is dissolved in a mixture of hydrobromic acid and bromine. Percholoric acid is added, and tin, antimony, and arsenic are removed as the volatile bromides by heating the acid solution. Nitric acid is added next and bismuth in the residual solution is precipitated as the oxychloride. The precipitate is dissolved in nitric acid, and the acidified bismuth solution is treated with thiourea to form a yellow complex.

The optical absorbancy of the colored solution is measured with a filter photometer, and the amount of bismuth is read from an absorbancy curve previously prepared by treating known amounts of bismuth with thiourea.

Because the procedure isolates bismuth from other metals, which also form complexes with thiourea, all of the added thiourea is available for forming the bismuth complex. At NBS, the method showed an accuracy of ± 0.002 pct of bismuth for lead-base and tin base alloys containing from 0.02 to 0.10 pct of the element.

"On my first day, 20 years ago, I ruined a lathe gear box."

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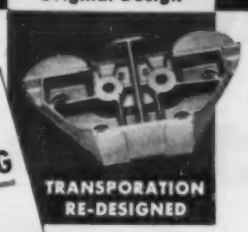

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—Technical Briefs—

Deoxidizer Aids Tool Life

Addition of a briquetted deoxidizer to the foundry furnace charge will produce iron castings that can be machined 25 pct faster than conventional castings, with up to 40 pct greater tool life, tool engineers heard recently. Frank S. Kleeman, Pittsburgh engineer, described the process at Chicago meeting of the American Society of Tool Engineers.

Cuts Costs—Deoxidized castings can cost less, too, Kleeman pointed out, because they often do not require an annealing operation before machining operations are performed.

An example given by Kleeman of what can be achieved in increased tool life by specifying deoxidized castings was an increase in tap life from 350 to 500 castings. The deoxidized castings were made from 100 pct scrap.

The deoxidizing agent that acts on the iron during melting is a specially prepared type of silicon carbide. It improves machinability by eliminating segregation of the microscopic constituents of cast iron and gives a structure of more or less random dispersion.

INTERNALLY WATER-COOLED inert arc welding torch is used at McGregor Mfg. Corp. to weld an Inconel part on a power recovery turbine for an aircraft engine. Savings in gas consumption with the General Electric torch are reported up to 25 pct.

Parts Automatically Gaged

Devices that control machine tool operation by automatically gaging the part during machining are helping industry produce close tolerance parts at lower cost with minimum scrap, thus offsetting rising costs and lack of skilled labor.

W. E. Moody and R. A. Green, engineers for Bay State Abrasive Products Co., Inc., Westboro, Mass., described the devices at a recent meeting of the American Society of Tool Engineers.

Automatic—The controls shut off the machine the instant parts are finished to size. The operator only has to load and unload the parts and performs no gaging operations of any kind.

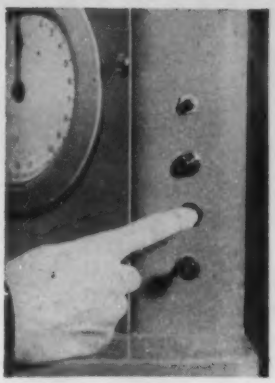
With automatic size controls parts can be produced up to three times as fast as where part dimensions have to be gaged by the operator of the machine, they said. Tolerances on the ground parts are within 0.0002 to 0.0003 in.

Inhibitors Slow Corrosion

Corrosion of automobiles resulting from use of salt compounds for de-icing may be substantially reduced through use of inhibitors, the National Assn. of Corrosion Engineers heard recently in a meeting in New York.

Charles T. Roland of Calgon, Inc., described experiments tried in Akron, Ohio, and Rochester, N. Y. Chromate and polyphosphate inhibtors were mixed with the de-icing salt. Tests on steel panels indicated corrosion could be reduced approximately 80 pct by the inhibitors. Field tests on automobiles however showed this percentage could not be obtained in practice.

New York City is conducting tests on Dept. of Sanitation trucks operating in selected areas under controlled conditions. Steel test coupons are attached to distribution transformers in underground manholes.



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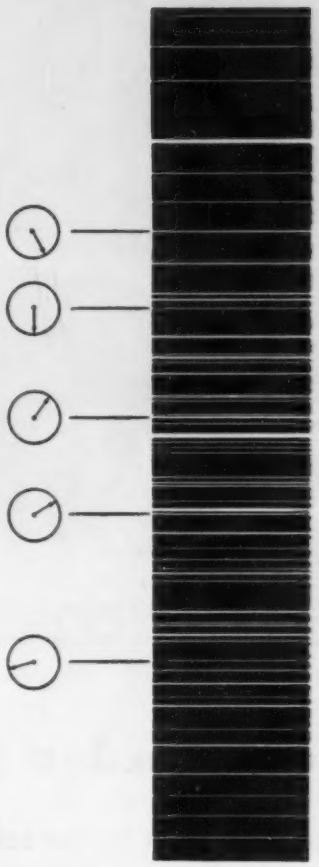

How much is your furnace time worth? A minimum value in many metal-producing industries is $1 to $2 a minute.

How long does sample analysis take, by standard chemical means? An average value would be from 15 to 20 minutes per analysis, using established wet-chemical laboratory methods.

In a year, how much does this represent in $$$$$? Many producers run 7,500 to 10,000 heats during a year. With a standard analysis on each heat, this means a total cost of $112,500 to $400,000 a year, in furnace time effectively lost.

OF THIS TOTAL COST
$75,000 to $300,000
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The Baird Associates-Dow Direct Reading Spectrometer permits a total analysis cycle — from furnace to laboratory to furnace correction — in about 5 minutes.

The "Direct Reader" is DIRECT — large clock-type dials indicate the percent concentration of each alloying element, in about 40 seconds after the single button control is pushed.

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A conference with a Baird Associates engineer will be arranged at your request and convenience. Our new Bulletin #34, on Direct Reading Analysis, is furnished free to those who request it.

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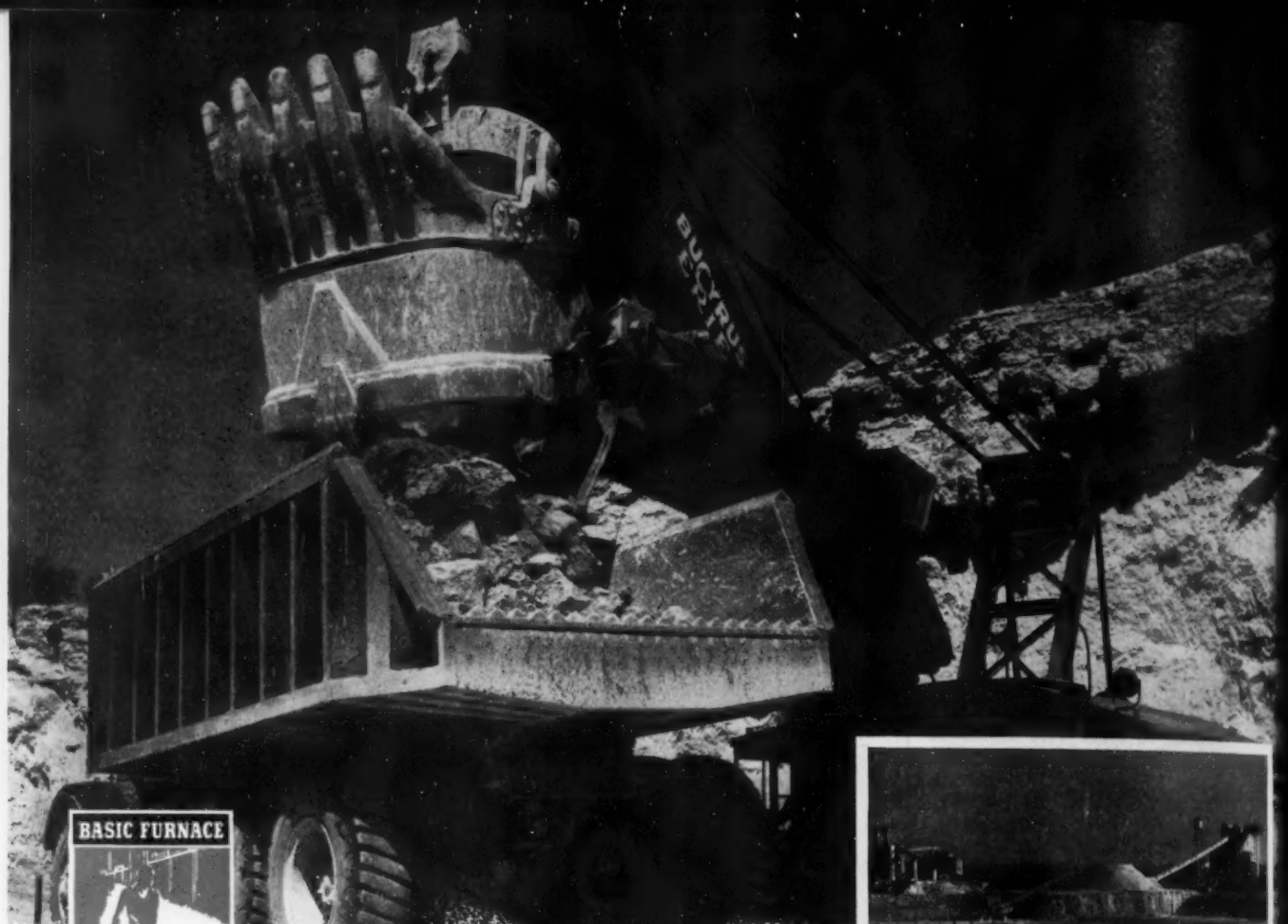


BASIC FURNACE REFRACTORIES

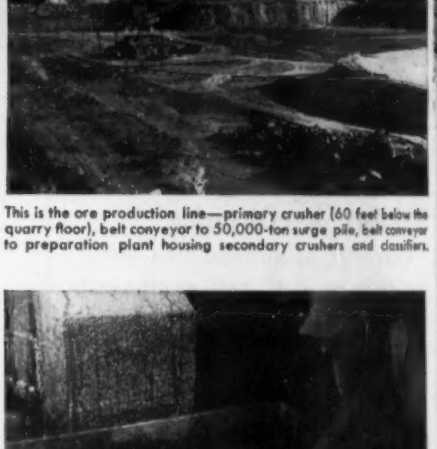
It takes only four passes of the shovel to load 24 tons of dolomite. Four big diesel trucks like this one haul rock to the primary crusher, each making an average of 80 trips a day.

This is the ore production line—primary crusher (60 feet below the quarry floor), belt conveyor to 50,000-ton surge pile, belt conveyor to preparation plant housing secondary crushers and classifiers.

Rock garden for steel plants

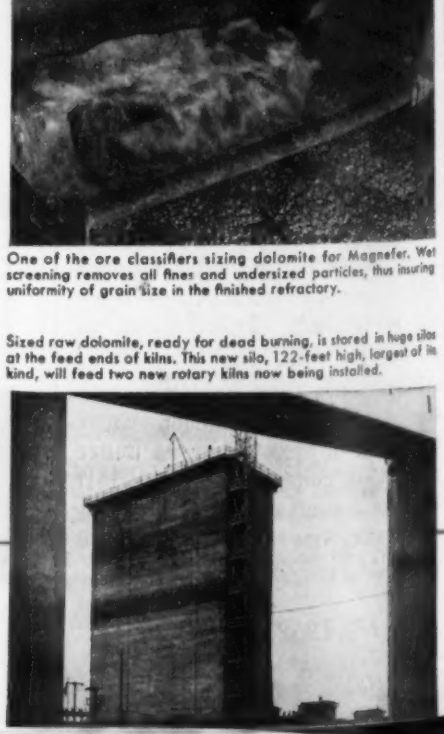
Steel plants live by the cultivation of this rock garden. For from this bed comes dolomite for Magnefer, Syndolag and other basic refractories used in the production of open hearth and electric furnace steel.

To keep pace with the expansion of the steel industry, we are enlarging our facilities for quarrying and preparation of ore, as well as for dead burning refractories. Happily, our reserves of this unusually pure dolomite at Maple Grove are sufficiently extensive to take care of the industry's needs for basic furnace refractories for an estimated 100 years.



One of the ore classifiers sizing dolomite for Magnefer. Wet screening removes all fines and undersized particles, thus insuring uniformity of grain size in the finished refractory.

Sized raw dolomite, ready for dead burning, is stored in huge silos at the feed ends of kilns. This new silo, 122-feet high, largest of its kind, will feed two new rotary kilns now being installed.



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Government Forcing Pistol Point Wage Agreement

Industry warned to reach wage agreement this week "or else" . . . Government will settle with union if companies don't . . . Ingot rate bounces back . . . Loss of output shaken off.

The government has warned the steel industry to reach a wage agreement this week "or else." Washington officials deny this, but the threat was made. The steel companies were left this choice: (1) They could "acquiesce" to a contract dictated by the government-union coalition, or (2) they could have it imposed upon them.

Either way, the steel wage case was moving nearer a solution, though collective bargaining had been reduced to a mockery. With the full weight of the Truman Administration thrown openly onto the side of Phil Murray's United Steelworkers, bargaining had become a one-way street. As expected, the union had maintained a bristling "all-or-nothing" stand, rejecting each industry offer as the companies bargained themselves closer to Wage Stabilization Board recommendations.

Pistol Point—Steel people—with no control over their industry—will lose most (if not all) of their anti-inflation stand. They might escape from the pistol-point negotiations without agreeing to the union shop, but the cents-per-hour raise and the fringe will be crammed down their throats.

Basis for the compulsory arbitration will be WSB-boss Feinsinger's plan. It calls for a 2-year contract. The "2-year plan" includes WSB recommendations, refigured on a 2-year basis. Although both sides have repulsed this settlement, it looks like the one that's coming this week—"voluntarily" or by force. The government will "negotiate" with labor, if steel people fail to fall into line.

The Package—Cents-per-hour in the Feinsinger plan add up to 15.63. When or if the Sunday, as such, fringe is computed on a cents-per-hour basis over 2 years, it is 1.75. This would mean 17.38¢ an hr, to which would be added 5.1¢ fringe — holidays, vacation and shift and sectional differential elimination. The result is a package of 22.5¢ per hr by WSB figuring, or close to 27¢ per hr costs the way steel firms figure.

It is expected that when the contract is agreed upon the government will allow a price increase of $5 a ton (or slightly more) to help, in a small way, to pay for the package.

Sixth Round—This will furnish the basis for the sixth wage round. Once again the steel industry has little say in the outcome of its wage-price picture. And once again other industries will have to meet the ante.

Last week the industry labored to get its furnaces back into operation. Steelmaking operations for the week averaged 63 pct of rated capacity (revised from estimated 41 pct). This week steelmaking operations are scheduled at 97 pct of rated capacity, an increase of 34 percentage points. By mid-week operations will be normal, except that product-mix of finishing mills will be aimed as much as possible at making urgently needed items and those hurt worst by the shutdown.

Mild Results — This was about the calmest shutdown the industry ever experienced. Most consumers who could afford to were carrying fairly good stocks. Those who weren't couldn't do anything about it because of government control over distribution.

Delivery of steel products is expected to be pushed back from 2 weeks to a month depending on the type of operation and the kind of product. Electric furnace items will bounce back into circulation much faster than those coming from the big openhearth melt shops. Steel products requiring furnace treatment will also encounter a longer delay in delivery.

Market Pitch — Warehouses reported some scare buying at the beginning of last week, but for the most part consumers were adopting a wait-and-see attitude. Warehouses were expected to renew their drive to get inventories into balance by curbing purchases of glutted items and energetically procuring those still in short supply. Bars, plates and structurals in big sizes remained tightest.

In Detroit steel interest is perking up a little. One factor is permission to start production of third quarter quotas in the latter half of June. This has auto makers trying to push July steel shipments forward into June.

Toss It Off—Of course the full effect of the steel shutdown won't hit consumers for about 2 more weeks. But, so far, little apprehension has been expressed. Never before during a steel shortage has a production loss of nearly a million tons been shaken off so lightly. From the consumer viewpoint this reflects fairly comfortable stocks. From the viewpoint of steel companies, they expect to make up the loss before the end of the second quarter through new capacity.

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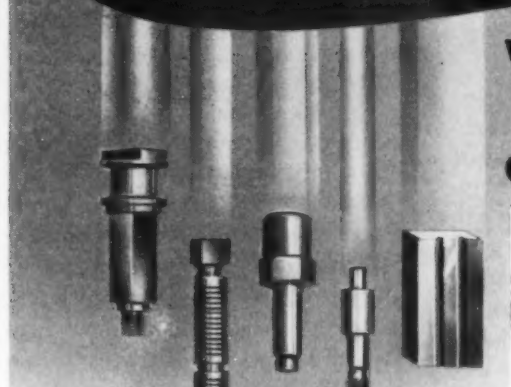
with long steady runs of B&L *Free-Machining* COLD FINISHED STEELS



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Market Briefs

Freight Rates—Interstate Commerce Commission this week granted the railroads a general freight rate increase of 15 pct over last August's rates. This supplants interim hikes of 9 pct in the East and 6 pct elsewhere. Exceptions included: Iron ore, 12 pct; coal and coke, 12 pct, subject to 40¢ per ton maximum; lignite, 6 pct, with a 20¢ maximum; and copper, lead and zinc, 12¢ per cwt. Charges for handling iron ore at Upper and Lower Lake ports were raised 15 pct. Water carriers and freight forwarders who were parties to the action get the same increases, which may be put in effect in 15 days.

Wages—Hourly wages in the iron and steel industry averaged $1.942 in February, 1.6¢ under January, when more overtime was involved, but 2.6¢ over February, 1952. Estimated total payroll for the industry was $234,864,000 in February, $15,452,000 more than a year ago, and $17,272,000 lower than January. Employment was estimated at 674,000, with wage earners working an average of 40.9 hr per week.

Output—British steel production in March was 155,381 tons, slightly over March, 1951. Pig iron output rose to the record figure of 977,961 tons, compared to 893,387 tons a year ago. Coke consumption was 2240 tons per week, leaving only 4 days' supply on the ground at blast furnaces. Deliveries of purchased coke have fallen to 7840 tons per week, as against the planned figure of 8500 tons.

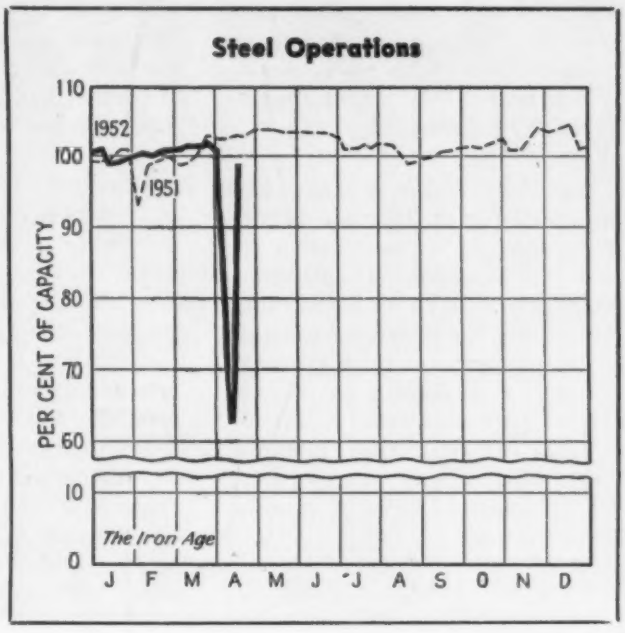
Expenditures—Class I railroads in 1951 spent $2,175,359,000 for fuel, materials and operating supplies of all kinds, according to Assn. of American R. R. Of this, $621,497,000 went for fuel and $703,855,000 for iron and steel products. Forest products took $188,186,000, with miscellaneous products, including cement, lubricating oils and grease, and electrical materials, costing $662,291,000. Total expenditures for supplies last year were $435,951,000 over 1950.

Seek New Producers—Defense Production Administration has cast 140,000 tons of aluminum bait for new producers. The agency has asked which new firms might be interested in a slice of this new expansion. DPA also wants specific information on the terms these embryo aluminum producers would want to set up in the industry. The reason: To compare the lot from the standpoint of national interest and future stockpiling.

More Materials—Small firms will find it easier to obtain supplemental allotments of controlled materials in the third quarter. National Production Authority said this week that "continued easing" of critical items has allowed relaxing of conditions under which grants may be made from the small business hardship account. Enough extra materials will be granted to allow operation at a minimum level. Previously, evidence of impending failure or prolonged shutdown was needed.

More Marks—An early increase of about $14 a ton in German steel prices is expected. Minister Erhard has asked the various steel and scrap associations to let him have their final views on his 3-point program: Freeing of the scrap price—official price is at present 92 marks per ton (about $22.50); permission for steel consumers to form central scrap purchasing agencies; and increase of steel prices.

Strike Damage—In preparing for the strike, a blast furnace at the Donora plant of U. S. Steel Co., American Steel & Wire Div., was damaged and blown out several months ahead of schedule. The furnace will be out 1 month to 6 weeks for partial relining.



District Operating Rates—Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	South	Ohio River	St. Louis	East	Aggregate
Apr. 6*	64.0*	59.0*	54.0*	70.0*	76.0*	59.5*	63.0*	95.0*	85.0*	58.5*	68.0*	73.0*	70.0*	63.0*
Apr. 13	102.0	94.0	98.0	98.0	100.0	90.0	96.5	104.0	100.0	102.0	95.5	90.0	85.0	97.5

Beginning Jan. 1, 1952, operations are based on annual capacity of 108,587,670 net tons.
*Revised.

Aluminum Has Strong Price Logic

Steel labor developments assure aluminum workers a like wage boost . . . Aluminum's lower-than-'39 price, vast expansion, smaller size all favor price hike—*By R. L. Hatschek.*

With steel workers virtually assured a substantial wage boost, aluminum workers are likewise certain to get an increase. The pattern in both industries will be most similar. But the similarity may end with the Office of Price Stabilization. Steel will likely batter out a price increase to compensate partially for the increased wage costs but the aluminum industry is in a far better arguing position.

Prime argument is that a dollar will buy more aluminum today than it would in 1939—despite the drop in a dollar's value. This is a potent point. Another point tilted strongly in favor of aluminum is the current expansion. No one wil deny that it costs money to expand steel—but aluminum capacity is being doubled. Such an expansion is not even being approached in any other major industry.

Size Favors—Yet a third valid argument for an increase in aluminum prices is the relative impact on economic stabilization. Tonnagewise, aluminum ranks first among the nonferrous metals but aluminum production this year will only total about 1 pct of steel output. This means that dollar for dollar a price boost in aluminum would have only a hundredth of the inflationary force of a price boost in steel.

It remains to be seen how these arguments will strike OPS when the price question is raised. The agency may remain adamant on the subject or it may yield somewhat—but it will certainly face strong argument from aluminum producers once the Wage Stabilization Board makes its recommendations this week.

Zinc Output High—Smelter production of slab zinc during March totaled 85,028 tons for a daily average of 2743 tons, next to the highest in history. This brings the first quarter total output to 245,529 tons, a rate which, if continued, will yield close to a million tons of slab zinc this year and will almost undoubtedly top all previous years. Only cloud on the horizon is the 25¢ per hour wage boost the Mine, Mill and Smelter Workers union has set its sights on.

Rebellion—It now appears that last week's Bolivian revolt has not been squashed. There is little doubt that the long dispute between the U. S. and the Bolivian tin industry had much to do in causing the rebellion. Bolivia is dependent on income from its main product—tin.

Resumption of talks between Reconstruction Finance Corp., the State Dept. and representatives of the Bolivian tin miners was slated for an early date. Since the U. S. has not recognized the new Nationalist Revolutionary Government there can be no immediate resumption of these talks. One thing looks certain—those now in power would like to nationalize the Bolivian tin industry.

It would seem that this unrest should add to the urgency with which the Bolivians are seeking a new contract with RFC.

Contract Ending—The current copper agreement with Chile expires on May 8. This fact makes it necessary that an agreement be reached quickly in regard to Chile's requests for a 6¢ per lb increase in the price of copper. Many in the trade consider the 33½¢ price somewhat ridiculous.

Demand in world markets has been slipping steadily—the reason Chile wants the boost is to make up for the 54¢ she cannot get elsewhere. Current world prices are down to a range of 35 to 40¢ and the feeling is that a 33½¢ price would soon slip even in the U. S. because of this reduced demand. At press time there were no new developments on the proposed strike which is scheduled for Apr. 25 by the Chilean workers.

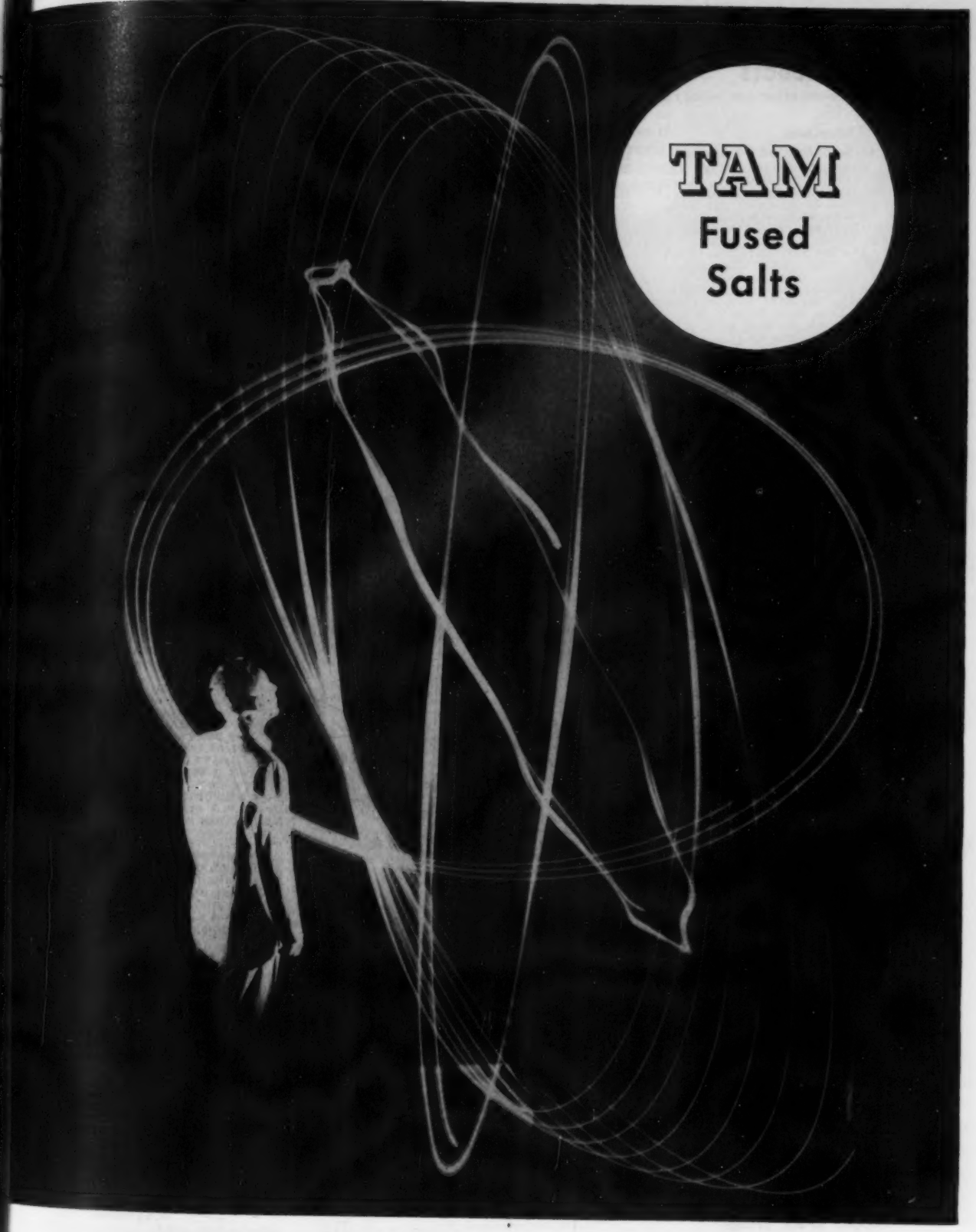
Waiting Word—As previously noted in this column, workers in the Connecticut Valley brass industry are getting impatient at the long delays of WSB to make a wage recommendation. Indicating the bitterness of this dispute is the fact that union and management have not yet been able to agree on plant maintenance in the event of a strike.

Industry representatives claim that the majority of the union demands do not come under WSB jurisdiction. They also calculate the cost of the union demands at over 80¢ per hour per worker. The big steel hassle has been holding up WSB.

NONFERROUS METAL PRICES

	Apr. 9	Apr. 10	Apr. 11	Apr. 12	Apr. 14	Apr. 15
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake delivered ...	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.215	$1.215	$1.215	....	$1.215	$1.215
Zinc, East St. Louis	19.50	19.50	19.50	19.50	19.50	19.50
Lead, St. Louis	18.80	18.80	18.80	18.80	18.80	18.80

Note: Quotations are going prices.



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Nonferrous Prices

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.8¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.8¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate ¼ in. and heavier: 2S, 3S-F, 28.3¢; 4S-F, 30.2¢; 52S-F, 31.8¢; 61S-O, 30.8¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.8¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.2¢ to 74.5¢; 12 to 14, 36.9¢ to 89¢; 24 to 26, 39.6¢ to $1.16; 36 to 38, 47.2¢ to $1.70.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 38.5¢; cold finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5 to 35¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32 in., 53.5¢ to 42¢; ⅜ to 1½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 39.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63S-ST-5, OD in in.: 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., $1.42; 96 in., $1.522; 120 in., $1.902; 144 in., $2.284. Gage 0.24 x 28 in., 72 in., $1.379; 96 in., $1.839; 120 in., $2.299; 144 in., $2.759. Coiled Sheet: 0.019 in. x 28 in., 28.2¢ per lb; 0.024 in. x 28 in., 26.9¢ lb.

Magnesium

(F.O.B. mill, freight allowed)

Sheet and Plate: FS1-O, ¼ in., 63¢; 3/16 in., 65¢; ⅛ in., 67¢; B & S Gage 10, 68¢; 12, 72¢. Specification grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam in., ¼ to 0.311 in., 74¢; ½ to ¾ in., 57.5¢; 1¼ to 1.749 in., 53¢; 2½ to 5 in., 48.5¢. Other alloys higher. Base up to ¾ in. diam, 10,000 lb; ⅞ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated, 0.10 to 0.11 lb, 3.5 in., 62.3¢; 0.22 to 0.25 lb, 5.9 in., 59.3¢; 0.50 to 0.59 lb, 8.6 in., 56.7¢; 1.8 to 2.59 lb, 19.5 in., 53.8¢; 4 to 6 lb, 28 in., 49¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb, ½ to 1.80 lb, 20,000 lb; 1.80 and heavier, 30,000 lb.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057; ¼ in. to 5/16, $1.40; 5/16 to ⅜, $1.26; ½ to ⅝, 98¢; 1 to 2 in., 76¢; 0.165 to 0.219, ⅝ to ¾, 61¢; 1 to 2 in., 57¢; 3 to 4 in., 56¢. Other alloys higher. Base, OD in in.: Up to 1½ in., 10,000 lb; 1½ in. to 3 in., 20,000 lb; 3 in. and larger, 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel and Monel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel
Sheets, cold-rolled	77	60½
Strip, cold-rolled	83	63½
Rods and bars	73	58½
Angles, hot-rolled	73	58½
Plates	75	59½
Seamless tubes	106	93½
Shot and blocks	..	53½

Copper, Brass, Bronze

(Freight prepaid on 200 lb)

	Sheet	Rods	Extruded Shapes
Copper	41.68	....	41.28
Copper, h-r	....	37.53	....
Copper, drawn	....	38.78	....
Low brass	39.67	39.36	....
Yellow brass	38.28	37.97	....
Red brass	40.14	39.83	....
Naval brass	43.20	37.26	38.52
Leaded copper	....	41.58	....
Com'l bronze	41.13	40.82	....
Mang. bronze	46.92	40.81	42.37
Phos. bronze	61.07	61.32	....
Muntz metal	41.18	36.74	37.99
Ni silver, 10 pct	49.82	52.04	....

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	19.00
Aluminum pig	18.00
Antimony, American, Laredo, Tex.	50.00
Beryllium copper, 3.75-4.25% Be	1.56
Beryllium aluminum 5% Be, Dollars per lb contained Be	$69.00
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.55
Cobalt, 97-99% (per lb)	$2.40 to $2.47
Copper, electro, Conn. Valley	24.50
Copper, Lake, delivered	24.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium dollars per troy oz.	$200
Lead, St. Louis	18.80
Lead, New York	19.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb.	24.50
Magnesium, sticks, 100 to 500 lb.	42.00 to 44.00
Mercury, dollars per 76-lb. flask, f.o.b. New York	$206 to $209
Nickel electro, f.o.b. N. Y. warehouse	59.58
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	52.75
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	88.00
Tin, New York	$1.215
Titanium, sponge	$5.00
Zinc, East St. Louis	19.50
Zinc, New York	20.20
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb, delivered carloads)

85-5-5-5 ingot	
No. 115	27.25
No. 120	26.75
No. 123	26.25
80-10-10 ingot	
No. 305	33.00
No. 315	30.50
88-10-2 ingot	
No. 210	41.50
No. 215	40.00
No. 245	34.50
Yellow ingot	
No. 405	23.25
Manganese bronze	
No. 421	30.50

Aluminum Ingot

(Cents per lb, 10,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	20.6
0.60 copper, max.	20.4
Piston alloys (No. 122 type)	21.2
No. 12 alum. (No. 2 grade)	19.5
108 alloy	20.6
195 alloy	20.8
13 alloy	20.8
ASX-679	20.5

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½%	18.80
Grade 2—92-95%	18.60
Grade 3—90-92%	18.40
Grade 4—85-90%	18.20

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	37.84
Electrodeposited	33¾
Flat rolled	38.34
Forged ball anodes	43
Brass, 80-20	
Cast, oval, 15 in. or longer	34¾
Zinc, oval	26½
Ball anodes	25½
Nickel 99 pct plus	
Cast	76.00
Rolled, depolarized	77.00
Cadmium	$2.80
Silver 999 fine, rolled, 100 oz lots, per troy oz., f.o.b. Bridgeport, Conn.	97½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	20½
Nickel chloride, 375 lb drum	27½
Silver cyanide, 100 oz lots, per oz.	67¼
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	47.7

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add ⅛¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	21½	20¾
Yellow brass	19½	17¾
Red brass	20½	19¾
Comm. bronze	20½	19¾
Mang. bronze	18½	17¾
Brass rod ends	18¾	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
Refinery brass	17.25*
Radiators	14.75

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
No. 1 composition	18.50
No. 1 comp. turnings	18.25
Rolled brass	15.50
Brass pipe	16.50
Radiators	14.75
Aluminum	
Mixed old cast	9.75
Mixed new clips	11.00
Mixed turnings, dry	9.50
Pots and pans	9.25

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	18¾—19¼
No. 2 heavy copper and wire	17¾—17¾
Light copper	16 —16¼
New type shell cuttings	16 —16¼
Auto radiators (unsweated)	14¼—14½
No. 1 composition	18 —18¼
No. 1 composition turnings	17¾—18
Unlined red car boxes	16¾—17¼
Cocks and faucets	15½—16
Mixed heavy yellow brass	13 —13½
Old rolled brass	15 —15½
Brass pipe	16 —16½
New soft brass clippings	16 —16½
Brass rod ends	15½—16
No. 1 brass rod turnings	15 —15½
Aluminum	
Alum. pistons and struts	6½— 7½
Aluminum crankcases	7½— 8
2S aluminum clippings	10½
Old sheet and utensils	7½— 8
Borings and turnings	5 — 6
Misc. cast aluminum	7½— 8
Dural clips (24S)	7½— 8
Zinc	
New zinc clippings	13¼—13½
Old zinc	10 —10¼
Zinc routings	6¾— 7
Old die cast scrap	6¾— 7
Nickel and Monel	
Pure nickel clippings	35 —36
Clean nickel turnings	35 —36
Nickel anodes	35 —36
Nickel rod ends	35 —36
New Monel clippings	28 —29
Clean Monel turnings	20 —21
Old sheet Monel	28 —29
Nickel silver clippings, mixed	13 —14
Nickel silver turnings, mixed	12 —13
Lead	
Soft scrap, lead	15¾—16
Battery plates (dry)	10 —10½
Batteries, acid free	7 — 7¼
Magnesium	
Segregated solids	15 —16
Castings	14 —15
Miscellaneous	
Block tin	100 —110
No. 1 pewter	80
No. 1 auto babbitt	60
Mixed common babbitt	16¼—16½
Solder joints	22 —23
Siphon tops	60
Small foundry type	21 —22
Monotype	18½—19
Lino. and stereotype	17½—18
Electrotype	16 —16½
Hand picked type shells	10 —11
Lino. and stereo. dross	8¾— 9
Electro. dross	7½— 8

THIS TRUCK'S 3500 GALLON TANK (insulated) carries bulk milk from farm to city dairy. To maintain purity of contents... and for permanence... it is made from chromium-nickel stainless steel.

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Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, austenitic stainless steels are obtainable for many end uses in defense and defense supporting industries. Counsel and data on alloys containing nickel, for your present production or future projects, are yours for the asking. We invite your inquiries.

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Scrap Flow Bounces Back to Normal

Passing of steel strike danger . . . Downtime of steel industry shorter than foreseen . . . Scrap movement returning to normal as mills lift restraints . . . Mill stockpiles seen improving.

The lurking danger of a steel strike passed last week as a desperate President tried to obscure his mishandling of the wage issue with fragmentary and misleading profit statistics—and a sour attitude of industry criticism. He handed the scrap trade industrial peace so that shipments would not be vastly curtailed. Among scrap men there was relief that a strike had been averted and worry about the manner in which it had been done.

Actual downtime of the steel industry was shorter than had been anticipated. Mills entrenching themselves for a strike had imposed restraints on shipments and the trade knew that should a strike occur scrap movement would diminish to near inactivity. Late last week as the steel industry pushed back into production scrap was beginning to recover.

This week shipments were expected to be back to normal levels. The strike had been a near-miss and scrap flow was not substantially affected. Some steel production was, of course, lost and with it some sales that scrap men could have made.

Scrap consumers have resumed adding to inventory. Some of the smaller steel mills are reported to have stockpiles in excess of 40 days. Large consumers have about half that amount but it is felt they could pick up considerably in today's market. A few areas report fixing of freight springboards.

National Production Authority allocations are losing their range and urgency. Some responsible scrap people believe the nation will beat the scrap shortage for the rest of the year. There is a soft murmur among some of the trade that price controls on scrap may have to go later this year.

Pittsburgh—Last week's near-strike had little effect on scrap movements. Consumers are still adding to inventories. A large mill reports a 20-day supply. As inventories mount, inspection standards grow tighter. Feeling prevails that unless the ingot rate continues at high level for the balance of the year we are over the hump on scrap. A 10,000-ton purchase of charging box cast at $47 delivered was reported.

Chicago — The mills were taking scrap last Friday after cutting off shipments. Scrap collection in rural areas was good, but industrial scrap was not in large supply. Electric furnace grades were moving more slowly and spring boards on borings and turnings have been eliminated.

Philadelphia—The steel strike was of too short duration to have any substantial effect on the scrap market here. Supply and demand for open-hearth materials continues about the same. Electric furnace material is fairly easy but not so soft as cast iron. There has been little business in charging box and heavy breakable. No prices changed last week.

New York—The scrap trade admits it had a close call, nearly being dragged down to relative inactivity because of the now-averted steel strike. The market was snapping back to normal and mills relaxed restraints on shipments. Brokers say the market should go back to its "good" pace, with mills buying steadily but not enthusiastically. One dealer says he may start handing out lollipops to buyers' kiddies with each shipment of cast.

Detroit — Movement of scrap returned to normal by the end of the week, but the trade felt the better part of a week's business had been lost. Plant scrap moved throughout the confusion, however. Dealers in some areas face a permanent loss of the market for steel plates where "captive" foundries are now baling their own scrap and placing it almost immediately in the charge.

Cleveland — Scrap started to flow slowly into the mills again late last week as shippers received notices to cancel previous hold-up instructions. Material was expected to start flowing heavily early this week as mills returned to full operation. Short duration of the shutdown was expected to have little effect on the scrap market in the area. Openhearth grades which started to show signs of easing may tighten up more now that full production may be expected for some time to come.

St. Louis—Strike-inspired orders to withhold shipments of scrap iron to this district were rescinded. But it required most of the week to get the material rolling again. In the meantime, mills have lowered the "springboard" for the second time recently. It has now been cut from $4 to $2, indicating that the mills are in good inventory shape. Brokers say that they will be able to buy at ceilings at the reduced freight rate.

Birmingham — Scrap dealers and brokers are back in business again and are filling orders for heavy melting that were held up by the mills when the steel strike threatened. Dealers report that, although some scrap is still coming in, it is slowing down a little as farmers turn to plowing and planting.

Cincinnati—Shutdown of steel operations here was short-lived as in other centers and scrap was once again being shipped to the mills late last week. Shipments at the end of the week were very light. Mills affected by the strike did not receive the flood of cars they anticipated prior to the short shutdown. This was felt to be due to diverting of scrap to other mills not affected by the shutdown.

Boston—A good, fairly active steel scrap market and an almost wholly inactive cast market are the contrasting features here. None of the dealers complain about the way scrap is being taken—except for cast.

Buffalo — Spring is bringing out more scrap. In-district allocations were reported.

for the purchase or sale of **scrap**

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SAN FRANCISCO, CAL. 300 Montgomery St.
SEATTLE, WASH. Smith Tower

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Iron and Steel

SCRAP PRICES

(Maximum basing point prices, per gross ton, as set by OPS in CPR 5 and amendments. Shipping point and delivered prices calculated as shown below.)

GRADES	OPS No.	Pittsburgh (.99) Johnstown (.75) Brackenridge, Butler (.53) Midland (.65) Monessen, Sharon (.75)	Youngstown (.75) Canton (.51) Steubenville (.51) Warren (.75) Weirton (.70)	Cleveland (.76) Buffalo (.53) Cincinnati (.65) Middletown (.26)	Chicago (1.34) Claymont (.75) Coatesville (.50) Conshohocken, Harrisburg (.20) Phoenixville (.51)	Sparrows Pt. (.20) Bethlehem (.52) Ashland, Ky. (.47) Kokomo, Ind. (.51) Portsmouth, O. (.51)	St. Louis (.51)	Detroit (.85)	Duluth (.50)	Kansas City (.76)	Birmingham (.50) Alabama City (.43) Atlanta (.51)	Minneapolis (.33)	Houston (.67)	Los Angeles (.66) Pittsburg, Cal. (.82) Portland, Ore. (.82) San Francisco (.82) Seattle (.82)
No. 1 bundles	1	$44.00	$44.00	$43.00	$42.50	$42.00	$41.00	$41.15	$40.00	$39.50	$39.00	$38.00	$37.00	$36.00
No. 1 busheling	2	44.00	44.00	43.00	42.50	42.00	41.00	41.15	40.00	39.50	39.00	38.00	37.00	36.00
No. 1 heavy melting	3	43.00	43.00	42.00	41.50	41.00	40.00	40.15	39.00	38.50	38.00	37.00	36.00	35.00
No. 2 heavy melting	4	43.00	43.00	42.00	41.50	41.00	40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00
No. 2 bundles	5	43.00	43.00	42.00	41.50	41.00	40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00
Machine shop turnings	6	34.00	34.00	33.00	32.50	32.00	31.00	31.15	30.00	29.50	29.00	28.00	27.00	25.00
Mixed borings and turnings	7	38.00	38.00	37.00	36.50	36.00	35.00	35.15	34.00	33.50	33.00	32.00	31.00	29.00
Shoveling turnings	8	38.00	38.00	37.00	36.50	36.00	35.00	35.15	34.00	33.50	33.00	32.00	31.00	29.00
Cast iron borings	10	38.00	38.00	37.00	36.50	36.00	35.00	35.15	34.00	33.50	33.00	32.00	31.00	29.00
No. 1 chemical borings	26	41.00	41.00	40.00	39.50	39.00	38.00	38.15	37.00	36.50	36.00	35.00	34.00	32.00
Forge crops	11	51.50	51.50	50.50	50.00	49.50	48.50	48.65	47.50	47.00	46.50	45.50	44.50	42.50
Bar crops and plate	12	49.00	49.00	48.00	47.50	47.00	46.00	46.15	45.00	44.50	44.00	43.00	42.00	40.00
Punchings and plate	14	48.50	48.50	47.50	47.00	46.50	45.50	45.65	44.50	44.00	43.50	42.50	41.50	39.50
Electric furnace bundles	15	46.00	46.00	45.00	44.50	44.00	43.00	43.15	42.00	41.50	41.00	40.00	39.00	37.00
Cut struct., plate, 3 ft and less	16	47.00	47.00	46.00	45.50	45.00	44.00	44.15	43.00	42.50	42.00	41.00	40.00	38.00
Cut struct., plate, 2 ft and less	17	49.00	49.00	48.00	47.50	47.00	46.00	46.15	45.00	44.50	44.00	43.00	42.00	40.00
Cut struct., 1 ft and less	18	50.00	50.00	49.00	48.50	48.00	47.00	47.15	46.00	45.50	45.00	44.00	43.00	41.00
Foundry steel, 2 ft and less	20	44.00	44.00	43.00	42.50	42.00	41.00	41.15	40.00	39.50	39.00	38.00	37.00	35.00
Foundry steel, 1 ft and less	21	46.00	46.00	45.00	44.50	44.00	43.00	43.15	42.00	41.50	41.00	40.00	39.00	37.00
Heavy trimmings	24	43.00	43.00	42.00	41.50	41.00	40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00
No. 1 RR heavy melting	RR 1	46.00	46.00	45.00	44.50	44.00	43.00	43.15	42.00	41.50	41.00	40.00	39.00	37.00
Scrap rails, random lengths	RR 14	48.00	48.00	47.00	46.50	46.00	45.00	45.15	44.00	43.50	43.00	42.00	41.00	39.00
Scrap rails, 3 ft and less	RR 16	51.00	51.00	50.00	49.50	49.00	48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00
Scrap rails, 2 ft and less	RR 17	52.00	52.00	51.00	50.50	50.00	49.00	49.15	48.00	47.50	47.00	46.00	45.00	43.00
Scrap rails, 18 in. and less	RR 18	54.00	54.00	53.00	52.50	52.00	51.00	51.15	50.00	49.50	49.00	48.00	47.00	45.00
Rerolling rails	RR 15	53.00	53.00	52.00	51.50	51.00	50.00	50.15	49.00	48.50	48.00	47.00	46.00	44.00
Uncut tires	RR 20	48.00	48.00	47.00	46.50	46.00	45.00	45.15	44.00	43.50	43.00	42.00	41.00	39.00
Cut tires	RR 21	51.00	51.00	50.00	49.50	49.00	48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00
Cut bolsters and side frames	RR 23	49.00	49.00	48.00	47.50	47.00	46.00	46.15	45.00	44.50	44.00	43.00	42.00	40.00
RR specialties	RR 24, 28, 29	51.00	51.00	50.00	49.50	49.00	48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00
Solid steel axles	RR 25	58.00	58.00	57.00	56.50	56.00	55.00	55.15	54.00	53.50	53.00	52.00	51.00	49.00
No. 3 steel wheels	RR 27	51.00	51.00	50.00	49.50	49.00	48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00
Unassorted	RR 35	40.00	40.00	39.00	38.50	38.00	37.00	37.15	36.00	35.50	35.00	34.00	33.00	31.00

Cast Scrap Ceilings

Prices set by CPR 5, OPS

(F.o.b. all shipping points)

Grades	OPS No.	
Cupola cast	1	$49.00
Charging box cast	2	47.00
Heavy breakable cast	3	45.00
Cast iron brake shoes	5	41.00
Stove plate	6	46.00
Clean auto cast	7	52.00
Unstripped motor blocks	8	43.00
Cast iron carwheels	9	47.00
Malleable	10	55.00
Drop broken mach'y cast	11	52.00

Ceiling price of clean cast iron foundry runout or prepared cupola drops is 75 pct of corresponding grade.

Cast Prices

(Below-Ceiling Prices)

PITTSBURGH
(Delivered)

Drop broken mach'y cast	$52.50 to $53.00
Cupola cast	45.00 to 46.00
Charging box cast	47.00
Heavy breakable	45.50 to 46.00

CHICAGO
(Delivered)

Cupola cast	$43.00 to $45.00
Stove plate	38.00 to 40.00
Heavy breakable	41.00 to 42.00
Drop broken machinery	45.00 to 46.50
Unstripped motor blocks	35.00 to 37.00
Charging box cast	43.00 to 45.00
Clean auto cast	46.00 to 47.00

PHILADELPHIA
(Delivered)

Cupola cast	$47.00 to $49.00
Heavy breakable	45.00
Clean auto cast	53.00 to 54.00
Unstripped motor blocks	39.00 to 40.00

CLEVELAND
(Delivered)

Unstripped motor blocks	$40.00 to $41.00

BIRMINGHAM
(Delivered)

Cupola cast	$42.00 to $43.00
Stove plate	39.00 to 40.00
Charging box cast	39.00 to 40.00
Heavy breakable	36.00 to 37.00
Drop broken machinery	42.00 to 43.00
Unstripped motor blocks	35.00 to 36.00

ST. LOUIS
(Delivered)

Heavy breakable	$45.00
Stove plate	42.00

NEW YORK
(Brokers' buying prices)

Drop broken machinery	$49.50 to $50.50
Mixed yard cast	42.00 to 43.00
Charging box cast	42.00 to 43.00
Heavy breakable	42.50 to 43.50
Unstripped motor blocks	35.00

BOSTON
(Brokers' buying prices)

Cupola cast	$45.00
Stove plate	42.00 to 43.00
Unstripped motor blocks	35.00

DETROIT
(Brokers' buying prices)

Cupola cast	$46.00
Charging box	45.00
Heavy breakable	43.00
Cast iron brake shoes	39.00
Stove plate	44.00
Unstripped motor blocks	40.00
Drop broken machinery cast	50.00

CINCINNATI
(Delivered)

Unstripped motor blocks	$40.00
Stove plate	45.00
Clean auto cast	47.00

BUFFALO
(F.o.b. shipping point)

Cupola cast	$47.00 to $48.00

SAN FRANCISCO
(Delivered)

Cupola cast	$42.00

LOS ANGELES
(Delivered)

Cupola cast	$46.00

SEATTLE
(Delivered)

Cupola cast	$36.50
Heavy breakable	32.00

SHIPPING POINT PRICES (Except RR scrap) —for shipping points within basing points, the ceiling shipping point price is the basing point price, less switching charge. The ceiling for shipping points outside basing points is the basing point price yielding the highest shipping point price, less the lowest established freight charge. Dock charge, where applicable, is $1.25 per gross ton except: Memphis, 95¢; Great Lakes ports, $1.50¢, and New England ports, $1.75. Maximum shipping point price on No. 1 bundles (prime grade) in New York City is $36.99 per gross ton with set differentials for other grades. Hudson and Bergen County, N. J., shipping point prices are computed from Bethlehem basing point. All New Jersey computations use all-rail transport. Cast scrap shipping point prices are given in table.

CEILING INTRANSIT PREPARATION CHARGES (Dollars per gross ton)

No. 1 heavy; No. 2 heavy; No. 1 RR heavy; No. 2 RR heavy; No. 1 busheling; No. 2 bundles; electric furnace bundles	$3.00
No. 1 bundles; briquetted turnings or cast iron borings; No. 1 RR sheet scrap	4.00
Crushing machine shop turnings	2.00
Bar crops and plate, cast steel, punchings and plate, cut structural and plate; 3 ft and under, foundry steel, 2 ft and under, wrought iron	10.00
Structural, plate scrap, 2 ft and less, foundry steel 1 ft and less	11.00
Structural and plate scrap, 1 ft and less	12.00
Rails, 3 ft & less; cut tires; cut bolsters & side frames	4.00
Rails, 2 ft & less	5.00
Rails, 18 in. & less	7.00

Hamilton, Ontario

(Consumers buying prices, del'd gross ton)

Hvy. melting steel	$35.00
No. 1 bundles	35.00
No. 2 bundles	34.50
Mechanical bundles	33.00
Mixed, steel scrap	31.00
Rails, remelting	35.00
Rails, rerolling	33.00
Bushelings	30.00
Bushelings, prepared new factory	33.00
Bushelings, unprepared new factory	23.00
Short steel turnings	32.00
Mixed borings, turnings	32.00
Cast scrap	50.00

Acme Steel Strapping Insures S.A. *(Safe Arrival)*

ACME STEEL

ACME STEEL PRODUCTS DIVISION
ACME STEEL COMPANY
2825 ARCHER AVE., CHICAGO 8, ILL.

An estimated $160,000,000 was lost last year in goods damaged or lost in shipment. Cooperate with the Perfect Shipping Campaign, sponsored by the National Association of Shippers Advisory Boards, to help reduce this loss.

Comparison of Prices

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Apr. 15, 1952	Apr. 8, 1952	Mar. 18, 1952	Apr. 17, 1951
Hot-rolled sheets	3.60	3.60	3.60	3.60
Cold-rolled sheets	4.35	4.35	4.35	4.35
Galvanized sheets (10 ga)	4.80	4.80	4.80	4.80
Hot-rolled strip	3.50	3.50	3.50	3.50
Cold-rolled strip	4.75	4.75	4.75	4.75
Plate	3.70	3.70	3.70	3.70
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R strip (No. 302)	36.75	36.75	36.75	36.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb.) cokes	$8.70	$8.70	$8.70	$8.70
Tinplate, electro (0.50 lb.)	7.40	7.40	7.40	7.40
Special coated mfg. ternes	7.50	7.50	7.50	7.50
Bars and Shapes: (cents per pound)				
Merchant bars	3.70	3.70	3.70	3.70
Cold finished bars	4.55	4.55	4.55	4.55
Alloy bars	4.30	4.30	4.30	4.30
Structural shapes	3.65	3.65	3.65	3.65
Stainless bars (No. 302)	31.50	31.50	31.50	31.25
Wrought iron bars	9.50	9.50	9.50	9.50
Wire (cents per pound)				
Bright wire	4.85	4.85	4.85	4.85
Rails (dollars per 100 lb)				
Heavy rails	$3.60	$3.60	$3.60	$3.60
Light rails	4.00	4.00	4.00	4.00
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$56.00	$56.00	$56.00	$56.00
Slabs, rerolling	56.00	56.00	56.00	56.00
Forging billets	66.00	66.00	66.00	66.00
Alloy blooms, billets, slabs	70.00	70.00	10.00	70.00
Wire Rod and Skelp: (cents per pound				
Wire rods	4.10	4.10	4.10	4.10
Skelp	3.35	3.35	3.35	3.35

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Pig Iron: (per gross ton)	Apr. 15, 1952	Apr. 8, 1952	Mar. 18, 1952	Apr. 17, 1951
Foundry, del'd Phila.	$57.97	$57.97	$57.97	$57.77
Foundry, Valley	52.50	52.50	52.50	52.50
Foundry, Southern, Cin'ti	55.58	55.58	55.58	55.58
Foundry, Birmingham	48.88	48.88	48.88	48.88
Foundry, Chicago†	52.50	52.50	52.50	52.50
Basic, del'd Philadelphia	57.09	57.09	57.09	56.92
Basic, Valley furnace	52.00	52.00	52.00	52.00
Malleable, Chicago†	52.50	52.50	52.50	52.50
Malleable, Valley	52.50	52.50	52.50	52.50
Charcoal, Chicago	70.56	70.56	70.56	70.56
Ferromanganese‡	186.25	186.25	186.25	186.25

†The switching charges for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy pages.

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$43.00*	$43.00*	$43.00*	$44.00*
No. 1 steel, Phila. area	41.50*	41.50*	41.50*	42.50*
No. 1 steel, Chicago	41.50*	41.50*	41.50*	42.50*
No. 1 bundles, Detroit	41.15*	41.15*	41.15*	41.15*
Low phos., Young'n	46.50*	46.50*	46.50*	46.50*
No. 1 cast, Pittsburgh	45.50‡	45.50‡	49.75‡	49.00†
No. 1 cast, Philadelphia	48.00‡	48.00‡	50.25‡	49.00†
No. 1 cast, Chicago	44.00‡	44.00‡	48.00‡	49.00†

* Basing Pt. † Shipping Pt. ‡ Del'd., includes broker's fee. Not including broker's fee after Feb. 7, 1951.

Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75	$14.75	$14.75	$14.75
Foundry coke, prompt	17.75	17.75	17.75	17.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	24.50	24.50
Copper, Lake, Conn.	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.215	$1.215	$1.215	$1.42
Zinc, East St. Louis	19.50	19.50	19.50	17.50
Lead, St. Louis	18.80	18.80	18.80	16.80
Aluminum, virgin	19.00	19.00	19.00	19.00
Nickel, electrolytic	59.58	59.58	59.58	53.55
Magnesium, ingot	24.50	24.50	24.50	24.50
Antimony, Laredo, Tex.	50.00	50.00	50.00	42.00

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.

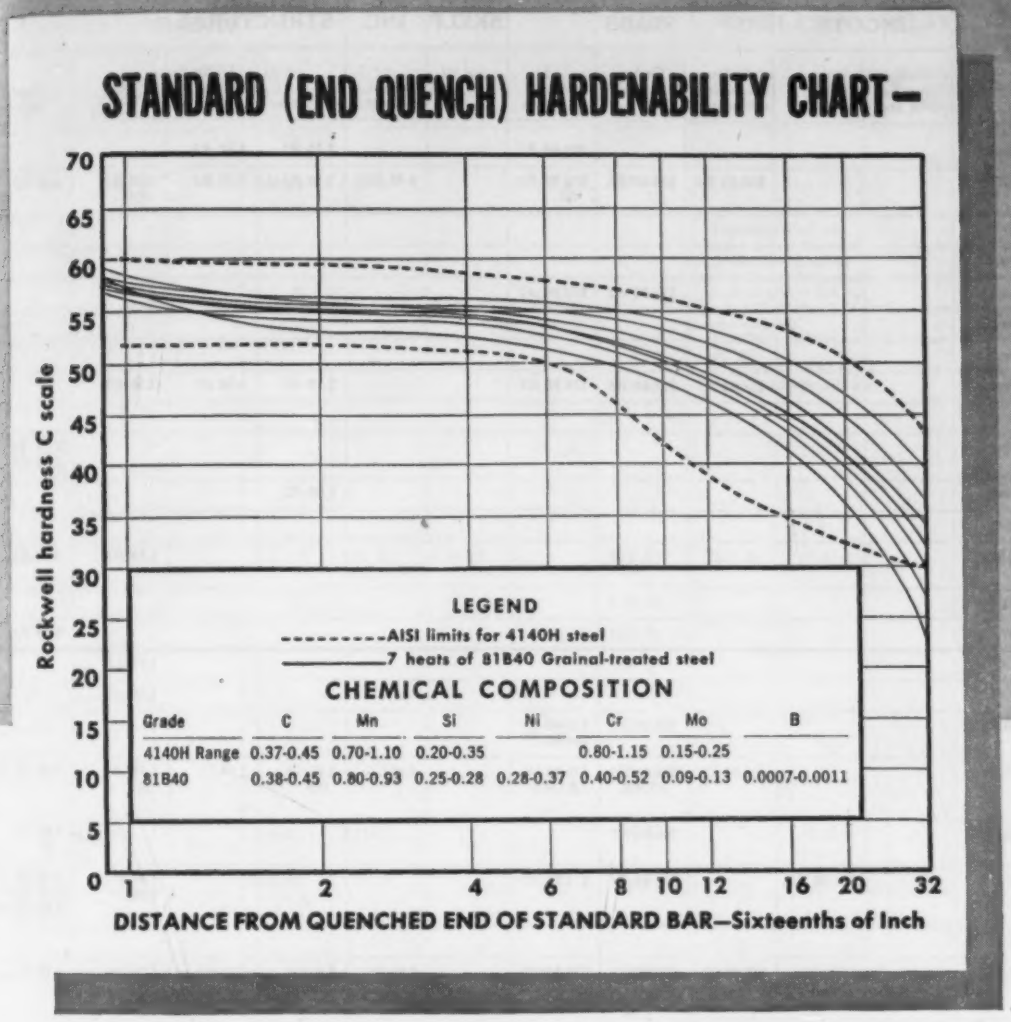
	Finished Steel Base Price	Pig Iron	Scrap Steel
Apr. 15, 1952	4.131¢ per lb.	$52.72 per gross ton	$42.00 per gross ton
One week ago	4.131¢ per lb.	52.72 per gross ton	42.00 per gross ton
One month ago	4.131¢ per lb.	52.72 per gross ton	42.00 per gross ton
One year ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton

	Finished Steel Base Price High	Finished Steel Base Price Low	Pig Iron High	Pig Iron Low	Scrap Steel High	Scrap Steel Low
1952	4.131¢ Jan. 1	4.131¢ Jan. 1	$52.72 Jan. 1	$52.72 Jan. 1	$42.00 Jan. 1	$42.00 Jan. 1
1951	4.131¢ Jan. 2	4.131¢ Jan. 2	52.72 Oct. 9	52.69 Jan. 2	47.75 Jan. 30	42.00 Oct. 23
1950	4.131¢ Dec. 1	3.837¢ Jan. 3	52.69 Dec. 12	45.88 Jan. 3	45.13 Dec. 19	26.25 Jan. 3
1949	3.837¢ Dec. 27	3.3705¢ May 3	46.87 Jan. 18	45.88 Sept. 6	43.00 Jan. 4	19.33 June 28
1948	3.721¢ July 27	3.193¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.193¢ July 29	2.848¢ Jan. 1	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.848¢ Dec. 31	2.464¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.464¢ May 29	2.396¢ Jan. 1	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.396¢	2.396¢	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.396¢	2.396¢	23.61	23.61	$19.17	$19.17
1942	2.396¢	2.396¢	23.61	23.61	19.17	19.17
1941	2.396¢	2.396¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	18.92 May 22
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.27207¢ May 16	22.61 Sept.19	20.61 Sept.12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	32.25 Mar. 9	20.25 Feb. 16	21.92 Mar.30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug.11	17.75 Dec. 21	12.67 June 8
1929	2.31773¢ May 28	2.26498¢ Oct. 29	1871 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.



Consistent Hardenability obtained in Boron Steels made with GRAINAL ALLOYS

The most common test for boron steels is measurement of hardenability by the end quench or Jominy hardenability test. Today's steel substitutions are made on the basis of similar hardenability since a reasonable prediction can thus be made of the hardness and strength of a given part.

The curves above show the relationship between the hardenability of a series of seven heats of 81B40 steel and the hardenability band for 4140H steel, which it often replaces. The 81B40 heats were made in one electric furnace shop, and the remarkably consistent hardenability shown by the curves was obtained by the use of Grainal alloy as the means of adding the boron.

Consistent hardenability means consistent strength and hardness after heat treatment, which is the aim of every fabricator. The best proof that the Grainal alloys insure this objective is found in the successful use of three million tons of Grainal-treated steels.

VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK 17, N.Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

MAKERS OF ALLOYS
VANCORAM
CHEMICALS AND METALS

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		INGOTS		BILLETS, BLOOMS, SLABS			PIPE SKELP	PILING	SHAPES STRUCTURAL		STRIP			
		Carbon Forging Net Ton	Alloy Net Ton	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Steel Sheet	Carbon	Hi Str. Low Alloy	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy
EAST	Bethlehem, Pa.					$70.00 *B3*			3.70 *B3*	5.50 *B3*				
	Buffalo, N. Y.			$56.00 *B3*	$66.00 *B3, R3*	$70.00 *B3, R3*		4.45 *B3*	3.70 *B3*	5.50 *B3*	3.50 *B3, R3*	4.65 *B3*	4.95 *B3*	6.40 *B3*
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.				$73.00 *A2*	$77.00 *A2*					3.90 *A2*		5.55 *A2*	
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.			$56.00 *B3*	$66.00 *B3*	$70.00 *B3*			3.70 *B3*	5.50 *B3*	3.50 *B3*			
	Newark, N. J.													
	New Haven, Conn.											5.15 *A5* 5.85 *D1*		
	Phoenixville, Pa.								5.90 *P2*					
	Putnam, Conn.													
	Sparrows Pt., Md.										3.50 *B3*	4.65 *B3*	4.95 *A5, B3*	6.40 *B3*
	Worcester, Mass.													
	Trenton, N. J.											6.00 *R4*		
MIDDLE WEST	Alton, Ill.										3.95 *L1*			
	Ashland, Ky.										3.50 *A7*			
	Canton-Massillon				$66.00 *R3*	$70.00 *R3* $66.00 *T5*								
	Chicago, Ill.			$56.00 *U1*	$66.00 *U1, R3, W8*	$70.00 *U1, R3, W8*		4.45 *U1*	3.65 *U1, W8*	5.50 *U1*	3.50 *A1, W8*	4.90 *A1, I3*		
	Cleveland, Ohio				$66.00 *R3*							4.65 *A5, J3*		6.55 *A5* 6.70 *J3*
	Detroit, Mich.		$54.00 *R5*		$69.00 *R5*	$73.00 *R5*					4.40 *M2* 3.80 *G4*	4.85 *G4* 5.45 *M2* 5.60 *R5, D1*	5.95 *G4*	
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana			$56.00 *U1*	$66.00 *U1*	$70.00 *U1, Y1*		4.45 *I3*	3.65 *U1, I3*	5.50 *U1, I3* 6.00 *Y1*	3.50 *U1, Y1, I3*	4.90 *I3*	5.30 *U1, I3* 5.80 *Y1*	
	Granite City, Ill.													
	Kokomo, Ind.													
	Middletown, Ohio										3.50 *A7*	4.65 *A7*		
	Niles, Ohio Sharon, Pa.										4.00 *S1*	5.35 *S1*	5.40 *S1*	6.55 *S1*
	Pittsburgh, Pa.	$52.00 *U1*	$54.00 *U1, C11*	$56.00 *U1*	$66.00 *U1*	$70.00 *U1, C11*	3.35 *U1* 3.45 *J3*	4.45 *U1*	3.65 *U1, J3*	5.50 *U1, J3*	4.00 *S9, S7* 3.75 *A3* 3.50 *J3, A7*	4.65 *J3, A7* 5.00 *A3* 5.35 *B4, S7*		
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.								3.90 *W3*		3.60 *W3*	4.65 *W3* 5.35 *F3*	5.75 *W3*	7.20 *W3*
	Youngstown, Ohio					$70.00 *Y1, C10*	3.35 *U1, R3*			6.00 *Y1*	3.50 *U1, R3, Y1*	4.65 *R3, Y1* 5.25 *C5, T4* 5.35 *B4*	5.30 *U1, R3* 5.80 *Y1*	6.55 *R3* 7.05 *Y1*
WEST	Fontana, Cal.	$79.00 *K1*	$80.00 *K1*	$75.00 *K1*	$85.00 *K1*	$89.00 *K1*			4.25 *K1*	6.10 *K1*	4.75 *K1*	6.30 *K1*	6.20 *K1*	6.95 *K1*
	Geneva, Utah				$66.00 *G1*				3.65 *G1*	5.50 *G1*				
	Kansas City, Mo.								4.25 *S2*		4.10 *S2*			
	Los Angeles, Cal.				$85.00 *B2*	$90.00 *B2*			4.25 *B2, C7*	6.05 *B2*	4.25 *B2, C7*	6.40 *C1*	6.05 *B2*	
	Minnequa, Colo.								4.10 *C6*		4.55 *C6*			
	San Francisco, Cal.				$85.00 *B2*				4.20 *B2*	6.00 *B2*	4.25 *C7, B2*		6.05 *B2*	
	Seattle, Wash.				$85.00 *B2*				4.30 *B2*	6.10 *B2*	4.50 *B2*		6.30 *B2*	
SOUTH	Atlanta, Ga.										4.05 *A8*			
	Birmingham, Ala.			$56.00 *T2*	$66.00 *T2*				3.60 *R3* 3.65 *T2*	5.50 *T2*	3.50 *R3, T2*		5.30 *T2*	
	Houston, Texas		$62.00 *S2*		$74.00 *S2*	$78.00 *S2*			4.05 *S2*		3.90 *S2*			

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL PRICES

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE	
Hot-rolled 10 ga. & hvyr.	Cold-rolled	Galvanized 10 ga.	Enameling 12 ga.	Long Terne 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 19 ga.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Hollowware Enameling 29 ga.	
										†Special coated mfg ternes deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb coke base box. *COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢.			Bethlehem, Pa.
3.80 *B3*	4.35 *B3*				5.40 *B3*	6.55 *B3*			4.10 *W6*				Buffalo, N. Y.
													Claymont, Del.
													Coatesville, Pa.
3.90 *A2*					5.65 *A2*								Conshohocken, Pa.
													Harrisburg, Pa.
													Hartford, Conn.
									4.10 *B3*				Johnstown, Pa.
													Newark, N. J.
													New Haven, Conn.
													Phoenixville, Pa.
													Putnam, Conn.
3.80 *B3*	4.35 *B3*	4.80 *B3*			5.40 *B3*	6.55 *B3*	6.75 *B3*		4.20 *B3*	$8.55 *B.*	$7.25 *B3*		Sparrows Pt., Md.
									4.40 *A5*				Worcester, Mass.
									4.20 *R4*				Trenton, N. J.
									4.40 *L1*				Alton, Ill.
3.90 *A7*		4.80 *A7*	4.65 *A7*										Ashland, Ky.
		4.80 *R3*											Canton-Massilon
3.80 *W8*					5.40 *U1*				4.10 *A5, R3, N4*				Chicago, Ill.
3.80 *R3, J3*	4.35 *R3, J3*		4.65 *R3*		5.40 *R3, J3*	6.55 *R3, J3*			4.10 *A5*		$7.15 *R3*		Cleveland, Ohio
3.80 *G4* 3.80 *M2*	4.55 *G4*				5.95 *G4*	7.10 *G4*							Detroit, Mich.
													Duluth, Minn.
3.80 *U1, Y1, I3*	4.35 *U1, Y1, I3*	4.80 *U1, I3*	4.65 *U1, I3*	5.20 *U1*	5.40 *U1, I3* 5.90 *Y1*	6.55 *U1, I3* 7.05 *Y1*		5.40 *I3*	4.10 *Y1*	$8.45 *B3, U1, Y1*	$7.15 *U1, I3*	5.85 *U1* 5.30 *Y1*	Gary, Ind. Harbor, Indiana
3.80 *G3*	5.05 *G3*	5.50 *G3*	5.35 *G3*								$7.35 *G3*	6.05 *G3*	Granite City, Ill.
		5.20 *C9*											Kokomo, Ind.
3.80 *A7*	4.35 *A7*	4.80 *A7*	4.65 *A7*	5.20 *A7*									Middleton, Ohio
3.25 *N3* 3.80 *S1*		6.00 *N3*		6.00 *N3*	5.40 *S1*								Niles, Ohio; Sharon, Pa.
3.80 *U1, Y1, A7* 3.75 *A3*	4.35 *U1, J3, A7*	4.80 *U1*	4.65 *U1*		5.40 *U1, J3*	6.55 *U1, J3*	7.20 *U1*		4.10 *A5* 4.30 *P6*	$8.45 *U1, J3*	$7.15 *U1, J3*	5.85 *U1*	Pittsburgh, Pa.
									4.30 *P7*				Portsmouth, Ohio
3.80 *W3, W5*	5.35 *F3* 4.35 *W3, W5*	4.80 *W3, W5*		5.20 *W3, W5*	5.75 *W3*	6.90 *W3*				$8.45 *W3, W5*	$7.15 *W3, W5*	6.15 *W5* 5.85 *F3*	Weirton, Wheeling, Follansbee, W. Va.
3.80 *U1, R3, Y1*	4.35 *R3, Y1*	5.50 *R1*	4.65 *Y1*	6.05 *E2*	5.40 *U1, R3* 5.90 *Y1*	6.55 *R3* 7.05 *Y1*		6.05 *R1, E2*	4.10 *Y1*	$8.45 *R3*		5.30 *R3*	Youngstown, Ohio
3.55 *K1*	5.30 *K1*				6.35 *K1*	7.50 *K1*			4.90 *K1*				Fontana, Cal.
3.70 *G1*													Geneva, Utah
													Kansas City, Mo.
3.80 *C7*		5.55 *C7*						5.40 *C7*	4.90 *B2, C7*	$9.20 *C7*	$7.90 *C7*		Los Angeles, Cal.
									4.35 *C6*				Minnequa, Colo.
3.80 *C7*	5.30 *C7*	5.55 *C7*							4.90 *A5*				San Francisco, Cal.
													Seattle, Wash.
													Atlanta, Ga.
3.80 *R3, T2*	4.35 *T2*	4.80 *R3, T2*			5.40 *T2*			4.75 *R3*	4.10 *R3, T2*	$8.55 *T2*	$7.25 *T2*		Birmingham, Ala.
									4.50 *S2*				Houston, Texas

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				4.30 *B3*	5.40 *B3*	5.55 *B3*					
	Buffalo, N. Y.	3.70 *B3,R3*	3.70 *B3,R3*	4.60 *B5*	4.30 *B3,R3*	5.40 *B3*	5.55 *B3*	3.70 *B3*				4.85 *W6*
	Claymont, Del.							4.15 *C4*		4.85 *C4*		
	Coatesville, Pa.							4.15 *L4*		5.25 *L4*		
	Conshohocken, Pa.							4.15 *A2*	4.75 *A2*	5.05 *A2*	5.90 *A2*	
	Harrisburg, Pa.							6.30 *C3*	6.30 *C3*			
	Hartford, Conn.			5.10 *R3*		5.85 *R3*						
	Johnstown, Pa.	3.70 *B3*	3.70 *B3*		4.30 *B3*		5.55 *B3*	3.70 *B3*		4.75 *B3*	5.65 *B3*	4.85 *B3*
	Newark, N. J.			5.00 *W10*		5.75 *W10*						
	New Haven, Conn.											
	Phoenixville, Pa.											
	Putnam, Conn.			5.10 *W10*								
	Sparrows Point, Md.		3.70 *B3*					3.70 *B3*		4.75 *B3*	5.65 *B3*	4.95 *B3*
	Worcester, Mass.			5.10 *B5*		5.75 *A5*						5.15 *A5,W6*
	Trenton, N. J.											
MIDDLE WEST	Alton, Ill.	4.15 *L1*										5.05 *L1*
	Ashland, Ky.							3.70 *A7*				
	Canton-Massillon	3.70 *R3*		4.55 *R3,R2*	3.95 *T5* 4.30 *R3*	4.90 *T5* 5.40 *R3,R2*						
	Chicago, Ill.	3.70 *U1, R3, W8*	3.70 *R3*	4.55 *A5,B5, W8, W10*	4.30 *U1,R3, W8*	5.40 *R3,W8, W10,B5,L2* 5.45 *A5*		3.70 *U1,W8*	4.75 *U1*	4.75 *U1*	5.65 *U1*	5.10 *W7* 4.85 *R3,A5, K2,N4*
	Cleveland, Ohio	3.70 *R3*	3.70 *R3*	4.55 *A5,C13*		5.45 *A5*	5.55 *R3,J3*	3.70 *R3,J3*	4.75 *J3*		5.65 *R3,J3*	4.85 *A5,C13*
	Detroit, Mich.	3.85 *R5*		4.70 *P8* 4.80 *P3*	4.45 *R5* 4.65 *G4*	5.55 *P8* 5.60 *P3*						
	Duluth, Minn.											4.85 *A5*
	Gary, Ind. Harbor, Indiana	3.70 *U1,R3, Y1,I3*	3.70 *U1,I3, Y1*	4.55 *R3,M5, L2*	4.30 *U1,I3, Y1*	5.40 *R3,M5, L2*	5.55 *U1,I3* 6.05 *Y1*	3.70 *U1,I3, Y1*	4.75 *I3*	4.75 *U1*	5.65 *U1,I3,* 6.15 *Y1*	5.10 *M4*
	Granite City, Ill.							4.40 *G4*				
	Kokomo, Ind.											4.95 *C9*
	Middletown, Ohio											
	Niles, Ohio Sharon, Pa.							3.95 *S1*		5.20 *S1*	5.70 *S1*	
	Pittsburgh, Pa.	3.70 *U1,J3*	3.70 *U1,J3*	4.55 *R3,A5, J3,S8,W10, C8*	4.30 *U1,C11*	5.40 *C11,S8, W10,C8,A5*	5.55 *U1,J3*	3.70 *U1,J3*	4.75 *U1*	4.75 *U1*	5.65 *U1,J3*	4.85 *A5,J3* 5.10 *P6*
	Portsmouth, Ohio											5.25 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	3.85 *W3*						4.00 *W3,W5*				
	Youngstown, Ohio	3.70 *U1,R3, Y1*	3.70 *U1,R3, Y1*	4.55 *Y1,F2*	4.30 *U1, Y1, C10*	5.40 *Y1,C10, F2*	5.55 *U1* 6.05 *Y1*	3.70 *U1,R3, Y1*			5.65 *R3* 6.15 *Y1*	4.85 *Y1*
WEST	Fontana, Cal.	4.40 *K1*	4.40 *K1*		5.35 *K1*		6.60 *K1*	4.30 *K1*		5.70 *K1*	6.25 *K1*	
	Geneva, Utah							3.70 *G1*			5.65 *G1*	
	Kansas City, Mo.	4.30 *S2*	4.30 *S2*		4.90 *S2*							5.45 *S2*
	Los Angeles, Cal.	4.40 *C7,B2*	4.40 *C7,B2*	6.00 *B2,R3*	5.35 *B2*		6.25 *B2*					5.80 *C7*
	Minnequa, Colo.	4.15 *C6*	4.50 *C6*					4.50 *C6*				5.10 *C6*
	San Francisco, Cal.	4.45 *B2* 4.40 *C7*	4.45 *B2,C7*				6.30 *B2*					5.80 *C7*
	Seattle, Wash.	4.45 *B2*	4.45 *B2*				6.30 *B2*	4.60 *B2*			6.55 *B2*	
SOUTH	Atlanta, Ga.	4.25 *A8*	4.25 *A8*									5.10 *A8*
	Birmingham, Ala.	3.70 *R3,T2*	3.70 *R3,T2*				5.55 *T2*	3.70 *R3,T2*			5.65 *T2*	4.85 *R3,T2*
	Houston, Tex.	4.10 *S2*	4.10 *S2*		4.70 *S2*			4.10 *S2*				5.25 *S2*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin Inc., Harvey, Ill.

C1 California Cold Rolled Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Steel Corp., Claymont, Del.
C5 Cold Metal Products Co., Youngstown
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia-Geneva Steel Co., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Glassport, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Geneva Steel Co., Salt Lake City
G2 Globe Iron Co., Jackson, O.
G3 Granite City Steel Co., Granite City, Ill.
G4 Great Lakes Steel Corp., Detroit

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago

K1 Kaiser Corp., Oakland, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Co., Inc., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Co., Pittsburgh
N3 Niles Rolling Mills Co., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.

O1 Oliver Iron & Steel Co., Pittsburgh

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div. Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co. (John A.), Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sloss Sheffield Steel & Iron Co., Birmingham
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Sweet's Steel Co., Williamsport, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal, Iron & R. R. Co., Birmingham
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Steel Co., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.

U1 United States Steel Co., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Co., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh

Y1 Youngstown Sheet & Tube Co., Youngstown

Steel Prices

Base price, f.o.b., dollars per 100 lb. *(Metropolitan area delivery add 20¢ except B'ham, San Fran., Cincinnati, New Orleans, St. Paul, add 15¢; Memphis, add 10¢; Phila., add 25¢; N. Y., add 30¢.)

WAREHOUSES — Cities	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates: Standard Structural	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled A 4615 As rolled	Alloy Bars: Hot-Rolled A 4140 Annealed	Alloy Bars: Cold-Drawn A 4615 As rolled	Alloy Bars: Cold-Drawn A 4140 Annealed
Baltimore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Birmingham*	5.59	6.37	7.20–7.35[1]	5.54	.....	5.85	5.70	5.52	7.60	.....	.....	.....	.....
Boston	6.29	6.98	8.35–8.59	6.15–6.50	7.74–8.70	6.38–6.63	6.20–6.22	6.05–6.88	6.78–6.99	10.25–10.30	10.55–11.50	11.95	12.15–12.25
Buffalo	5.50–5.54	6.28–6.32	8.20–8.23	5.86–6.10	.....	5.89–5.98	5.80–5.82	5.52–5.55	6.18–6.45	10.15	10.45–10.48	11.80	12.10–12.13
Chicago	5.54	6.32	7.85	5.49	.....	5.70	5.65	5.47	6.30	.....	10.10	.....	11.75
Cincinnati*	5.84	6.38	8.29	5.77	.....	6.14	6.09	5.75	6.64	.....	10.49	.....	12.14
Cleveland	5.54	6.32	7.98	5.65	.....	5.82	5.98	5.95	6.40	.....	10.21	.....	11.86
Detroit	5.79	6.50	8.47	6.15	.....	6.14	6.09	5.74	6.64	.....	10.45	.....	12.10
Houston	6.35–6.58	7.37–8.09	8.57	6.15	.....	6.39–6.42	6.32–6.35	6.38	8.38–8.63	10.95	11.12–11.25	11.40	12.62–12.90
Indianapolis, del'd	5.94	6.72	8.25	5.89	.....	6.10	6.05	5.87	6.80	.....	10.50	.....	.....
Kansas City	6.22–6.40	7.64–7.68	8.66–8.70	6.10–6.90	7.81	6.38–6.74	6.43–6.48	6.20–6.77	7.01–7.22	10.00	10.10	11.50	11.80
Los Angeles	6.30	8.10–8.45	9.30–9.35	6.40	10.45	6.30	6.30	6.25	8.15	11.30	11.30	13.05	13.50
Memphis*	6.25	7.03	7.51	6.20	.....	6.36	6.36*–6.61**	6.33*–6.57**	7.11	.....	.....	.....	.....
Milwaukee	5.70	.....	8.01	5.65	.....	5.86	5.81	5.63	6.61	.....	10.26	.....	.....
New Orleans*	5.98	7.01	8.26	5.93	.....	6.09	6.09	5.91	7.02	.....	.....	.....	.....
New York*	6.10–6.52	6.87–6.91	8.25	7.19–6.49	7.67	6.44–6.88	6.07–6.40	6.19–6.42	6.99–7.29	10.45	10.48–10.75	12.10	11.40–12.40
Norfolk	6.68	.....	.....	6.33	.....	6.20	6.20	5.95	7.30	.....	.....	.....	.....
Philadelphia*	5.79–6.07	6.72–7.22	8.10–8.38	6.08–6.35	7.15	6.05–6.19	5.84–6.09	6.02–6.27	6.91–7.16	9.82–10.17	10.22–10.47	11.82	11.88–12.12
Pittsburgh	5.54	.....	8.25	5.84	.....	5.70	5.65	5.47	6.40	.....	10.10	.....	11.75
Portland	.....	9.00	9.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salt Lake City	7.95	.....	9.80–10.35	8.00	.....	7.45	7.60	7.95	.....	.....	.....	.....	.....
San Francisco*	6.51–6.65	7.88–8.23	9.10–9.25	6.44–6.60	10.45	6.39	6.45	6.34–6.45	8.15–8.20	11.30	11.30	13.05	13.50
Seattle	7.07	8.64	.....	7.70	.....	6.90	6.54	6.70	9.05	.....	.....	.....	.....
St. Louis	5.73–5.82	6.60–7.15	8.13	5.77–6.36	7.66	6.07	6.02–6.22	5.75–5.80	6.68	10.08	10.38	11.73	12.03
St. Paul*	6.14	6.92	8.45	6.09	.....	6.25	6.25	6.07	6.75	.....	.....	.....	.....

BASE QUANTITIES (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanizing sheets, for quantity.
EXCEPTIONS: (1) 500 to 1499 lb.

STAINLESS STEELS

Base price, cents per lb, f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots rerolling	14.25	15.25	16.75	16.25	24.75	20.00	21.75	12.75	14.75	13.00
Slabs billets rerolling	18.50	20.00	22.00	21.00	32.25	26.25	28.50	16.50	20.00	16.75
Forg. discs die blocks rings	34.00	34.25	36.75	35.75	53.00	40.25	44.75	28.00	28.50	28.50
Billets forging	26.25	26.50	28.50	27.75	41.50	31.25	35.00	21.50	22.00	22.00
Bars wires structurals	31.25	31.50	34.00	33.00	49.25	37.00	41.50	25.75	26.25	26.25
Plates	33.00	33.25	35.25	35.25	52.00	40.75	45.25	27.00	27.50	27.50
Sheets	41.00	41.25	43.25	43.25	57.00	49.25	53.75	36.50	37.00	39.00
Strip hot-rolled	26.50	28.25	32.50	30.25	48.75	37.00	41.25	23.50	30.25	24.00
Strip cold-rolled	34.00	36.75	40.25	38.75	59.00	48.25	52.25	30.50	37.00	31.00

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2;* (type 316 add 4.5¢) *J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4;* Lockport, N. Y., *R4.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* (type 316 add 4.5¢); W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Lockport, N. Y., *S4;* New Britain, Conn., *S7;* Sharon, Pa., *S1* (type 301 add ¼¢); Butler, Pa., *A7;* Wallingford, Conn., *W1.*

Bars: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y. *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Lockport, N. Y., *S4;* Canton, O., *T5;* Ft. Wayne, *J4.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* F. Wayne, *J4;* Trenton, N. J., *R4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3* (type 416 add ¼¢); Butler, Pa., *A7;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Lockport, N. Y., *S4;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3.*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11.*

ALLEGHENY LUDLUM—Slightly higher on Type 301; slightly lower on others in 300 series.
WASHINGTON STEEL—Slightly lower on 300 series except where noted.

PIPE AND TUBING

Base discounts, f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS					
	⅛ In.		¼ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½-3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																				
Sparrows Pt. *B3*	34.0	12.0	37.0	16.0	39.0	19.5	40.0	20.0	40.5	21.0	41.0	21.5	41.5	22.0	....	....	....	....	....	....
Cleveland *R3*	36.0	14.0	39.0	18.0	41.5	21.5	42.9	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Oakland *K1*	25.0	3.0	28.0	7.0	30.5	10.5	31.0	11.0	31.5	12.0	32.0	12.5	32.5	13.0	....	....	....	....	....	....
Pittsburgh *I3*	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21 5	43.5	22.5	29.5	8.0	32.5	11.5	34.5	13.5
Pittsburgh *N2*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
Alton, Ill. *L1*	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0	....	....	....	....	....	....
Sharon *M3*	36.0	13.0	39.0	17.0	41.5	21.0	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	....	....	....	....	....	....
Pittsburgh *N1*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	....	32.5	....	34.5	....
Wheeling *W5*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Wheatland *W4*	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown *Y1*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
EXTRA STRONG PLAIN ENDS																				
Sparrows Pt. *B3*	33.5	13.0	37.5	17.0	39.5	20.5	40.0	21.0	40.5	22.0	41.0	22.5	41.5	23.0	....	....	....	....	....	....
Cleveland *R3*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Oakland *K1*	24.5	4.0	28.5	8.0	30.5	11.5	31.0	12.0	31.5	13.0	32.0	13.5	32.5	14.0	....	....	....	....	....	....
Pittsburgh *J3*	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.0	7.5	33.0	12.0	36.5	15.5
Pittsburgh *N2*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	10.0	33.0	14.0	36.5	17.5
Alton, Ill. *L1*	32.5	12.0	36.5	16.0	38.5	19.5	39.0	20.0	39.5	21.0	40.0	21.5	40.5	22.0	....	....	....	....	....	....
Sharon *M3*	35.5	14.0	39.5	18.0	41.5	21.0	42.0	21.5	42.5	22.0	43.0	22.5	43.5	23.0	....	....	....	....	....	....
Pittsburgh *N1*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	....	33.0	....	36.5	....
Wheeling *W5*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Wheatland *W4*	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown *Y1*	35.5	15.0	39.5	19.0	41.0	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	26.0	29.0	10.0	33.0	14.0	36.5	17.5

Galvanized discounts based on zinc, at 17¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ¼ pt. Calculate discounts on even cents per lb of zinc, i. e., if zinc is 16.51¢ to 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢.

Threads only, buttweld and seamless, 1 pt. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 3½ pts. higher discount. Buttweld jobbers' discount, 5 pct. East St. Louis zinc price now 19.50¢.

COKE

Furnace, beehive (f.o.b. oven)	Net-Ton
Connellsville, Pa.	$14.50 to $15.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$17.50 to $18.00
Foundry, oven coke	
Buffalo, del'd	$26.69
Chicago, f.o.b.	23.00
Detroit, f.o.b.	24.00
New England, del'd	24.80
Seaboard, N. J., f.o.b.	22.75
Philadelphia, f.o.b.	22.70
Swedeland, Pa., f.o.b.	22.60
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	23.50
Cleveland, del'd	25.72
Cincinnati, del'd	25.06
St. Paul, f.o.b.	22.50
St. Louis	25.40
Birmingham, del'd	21.69
Neville Island	23.00

ELECTRICAL SHEETS

22 Ga. H-R cut length F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech Bottom *W5*	....	7.25	8.50	9.30	9.85	10.40	11.10
Brackenridge *A3*	....	7.25	8.50	9.30	9.85	....	....
Follansbee *F3*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Granite City *G3*	....	7.95	9.20	....	....	....	....
Ind. Harbor *B3*	6.75	7.25	....	....	....	....	....
Mansfield *E2*	7.25	7.75	9.00	9.80	....	....	....
Niles, O. *N3*	7.05	7.55	....	....	....	....	....
Vandergrift *U1*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Warren, O. *R3*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Zanesville *A7*	6.75	7.25	8.50	9.30	9.85	10.40	11.10

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Foundry	Malleable	Bessemer	Low Phos.	Bl. Furnace Silvery	Low Phos. Charcoal
Bethlehem *B3*	54.00	54.50	55.00	55.50	....	....	....
Birmingham *R3*	48.38	48.88	....	....	....	....	....
Birmingham *W9*	48.38	48.88	....	....	....	....	....
Birmingham *S5*	48.38	48.88	....	....	....	....	....
Buffalo *R3*	52.00	52.50	53.00	....	....	....	....
Buffalo *H1*	52.00	52.50	53.00	....	....	63.75	....
Chicago *I4*	52.00	52.50	52.50	53.00	....	....	....
Cleveland *A5*	52.00	52.50	52.50	53.00	57.00	....	....
Cleveland *R3*	52.00	52.50	52.50	....	....	....	....
Daingerfield, Tex. *L3*	48.00	48.50	48.50	....	....	....	....
Duluth *I4*	52.00	52.50	52.50	53.00	....	....	....
Erie *I4*	52.00	52.50	52.50	53.00	....	....	....
Everett, Mass. *M6*	....	59.75	60.25	....	....	....	....
Fontana *K1*	58.00	58.50	....	....	....	....	....
Geneva, Utah *U1, Y1*	52.00	52.50	52.50	53.00	....	....	....
Granite City, Ill. *K3*	53.90	54.40	54.90	....	....	....	....
Hubbard, Ohio *Y1*	52.00	52.50	52.50	....	....	....	....
Ironton, Utah *C7*	52.00	52.50	....	....	....	....	....
Jackson, Ohio *J1, G2*	....	....	....	....	....	62.50	....
Lyle, Tenn. *T3*	....	....	....	....	....	....	66.00
Monessen *P6*	54.00	....	....	....	....	....	....
Neville Island *P4*	52.00	52.50	52.50	53.00	....	....	....
Pittsburgh *U1*	52.00	....	....	53.00	....	....	....
Sharpsville *S3*	52.00	52.50	52.50	53.00	....	....	....
Steelton *B3*	54.00	54.50	55.00	55.50	60.00	....	....
Swedeland *A2*	56.00	56.50	57.00	57.50	....	....	....
Toledo *I4*	52.00	52.50	52.50	53.00	....	....	....
Troy, N. Y. *R3*	54.00	54.50	55.00	....	60.00	....	....
Youngstown *Y1*	52.00	52.50	52.50	53.00	....	....	....
N. Tonawanda, N. Y. *T1*	....	52.50	53.00	....	....	....	....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base, (1.75 to 2.25 pct, except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 pct and over. Silvery Iron: Add $1.50 per net ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. $1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosil on prices are $1 over comparable silvery iron.

BOILER TUBES

Per 100 ft. cut, 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	22.67	26.66	21.99	25.86
	2½	12	29.48	35.04	29.57	34.76
	3	12	33.90	39.90	32.89	38.70
	3½	11	42.37	49.89	41.10	48.39
	4	10	52.60	61.88	51.03	60.02
National Tube	2	13	21.62	26.48	....	....
	2½	12	29.65	36.32	....	....
	3	12	34.00	41.64	....	....
	3½	11	40.34	49.41	....	....
	4	10	51.21	62.72	....	....
Pittsburgh Steel	2	13	....	27.08	....	....
	2½	12	30.49	37.15	....	....
	3	12	34.95	42.59	....	....
	3½	11	41.48	50.54	....	....
	4	10	52.65	64.16	....	....

CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	$105.30 to $108.90
6 to 24-in., del'd N.Y.	108.50 to 109.50
6 to 24-in., Birmingham	91.50 to 96.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipment less	$123.00 to $130.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

C-R SPRING STEEL

Cents Per Lb. F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bridgeport, Conn. *S7*	5.35	6.80	7.40	9.35	11.65
Carnegie, Pa. *S9*	....	6.80	7.40	9.35	11.65
Cleveland *A5*	4.65	6.45	7.40	9.35	11.65
Detroit *D1*	5.60	6.65	7.25	....	....
New Castle, Pa. *B4*	5.35	6.80	7.40	9.3	....
New Haven, Conn. *D1*	5.85	6.75	7.35	....	....
Sharon, Pa. *S1*	5.35	6.80	7.40	9.35	11.65
Weirton, W. Va. *W3*	5.35	6.80	7.40	9.35	11.65
Worcester, Mass. *A5*	4.95	6.75	7.70	9.65	11.65
Youngstown *C5*	....	6.80	7.40	9.35	11.65

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Casted Nails Base Col.	Woven Wire Fence 9–15½ ga. Base Col.	Fence Posts Base Col.	Single Loop Bale Ties Base Col.	Twisted Barbless Wire Base Col.	Galv. Barbed Wire Base Col.	Merch. Wire Annld Base Col.	Merch. Wire Galv.* ¢/lb.	Cat. ¢/lb.
Alabama City *R3*	118	126	....	123	....	136	136	5.70	5.95
Aliquippa, Pa. *J3*	118	132	....	....	136	140	140	5.70	6.15
Atlanta *A8*	121	133	....	126	126	143	143	5.95	6.40
Bartonville *K2*	118	130	....	123	143	143	143	5.70	6.15
Buffalo *W6*	....	....	....	....	....	....	....	4.85	....
Cleveland *A6*	125	....	....	....	....	....	....	....	....
Cleveland *A5*	....	....	....	....	....	....	....	5.70	6.15
Crawfrdsvl. *M4*	....	132	....	....	....	....	145	5.95	6.40
Donora, Pa. *A5*	118	130	....	123	140	140	140	5.70	6.15
Duluth *A5*	118	130	....	123	140	140	140	5.70	6.15
Fairfield, Ala. *T2*	118	130	....	123	....	....	140	5.70	6.15
Houston *S2*	126	138	....	....	....	....	148	6.10	6.55
Johnstn., Pa. *B3*	118	130	....	....	....	140	....	5.70	6.15
Joliet, Ill. *A5*	118	130	....	123	....	....	140	6.70	6.15
Kokomo, Ind. *C9*	120	132	....	125	138	....	142	5.80	6.05
Los Angeles *B2*	....	....	....	....	....	....	....	6.65	....
Kansas City *S2*	130	....	....	135	....	....	152	6.30	6.75
Minnequa *C6*	123	138	130	128	146	....	146	5.95	6.45
Monessen *P6*	124	135	....	....	....	....	145	5.95	6.40
Moline, Ill. *R3*	....	....	136	....	....	....	....	....	....
Pittsburg, Cal. *C7*	137	....	....	147	156	....	160	6.65	6.80
Portsmouth *P7*	124	137	....	....	147	....	147	6.10	6.60
Rankin, Pa. *A5*	118	130	....	....	140	....	140	5.70	6.15
So. Chicago *R3*	118	126	140	123	....	....	136	5.70	5.95
S. San Fran. *C6*	....	....	....	147	....	....	160	6.65	7.10
Sparrows Pt. *B3*	120	....	....	125	142	....	142	5.80	6.25
Sterling, Ill. *N4*	118	130	....	123	140	....	140	5.70	6.15
Struthers, O. *Y1*	....	....	....	....	....	....	....	6.70	6.15
Terrance, Cal. *C7*	138	....	....	....	....	....	....	6.65	....
Worcester *A5*	124	....	....	....	....	....	....	6.00	6.45
Williamsport, Pa. *S10*	....	....	150	....	....	....	....	....	....

Cut Nails, carloads, base $7.35 per 100 lb. (less 20¢ to jobbers), at Conshohocken, Pa., (*A2*), Wheeling, W. Va., (*W5*), $7.15.

* Alabama City and So. Chicago don't include zinc extra.

Miscellaneous Prices—

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb.	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Axles	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	3.60	4.00	4.70					
Chicago *R3*				6.15				
Cleveland *R3*						9.35		
Conshohocken, Pa. *A2*								
Conshohocken, Pa. *A2*	3.60	4.00						
Fairfield *T2*		4.00	4.70	6.15	5.60		4.50	9.80
Gary *U1*	3.60	4.00					4.50	
Ind. Harbor *I3*	3.60		4.70	6.15	5.60		4.50	
Johnstown *B3*		4.00			5.60			
Joliet *U1*		4.00	4.70					
Kansas City *S2*				6.40				9.85
Lackawanna *B3*	3.60	4.00	4.70				4.50	
Lebanon *B3*				6.15		9.35		9.85
Minnequa *C6*	3.60	4.50	4.70	6.15			4.50	9.85
Pittsburgh *R3*						9.35		
Pittsburgh *O1*						9.35		9.85
Pittsburgh *P5*								9.85
Pittsburgh *J3*				6.15				
Pitts., Cal. *C7*							4.65	
Seattle *B2*				6.65			4.65	
Steelton *B3*	3.60		4.70				4.50	
Struthers *Y1*				6.15				
Torrance *C7*							4.65	
Youngstown *R3*				6.15				

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.505
18	4	1	—	5	$2.13
18	4	2	—	—	$1.65
1.5	4	1.5	8	—	81.0¢
6	4	2	6	—	96.5¢

High-carbon chromium ..... 63.5¢
Oil hardened manganese ..... 35¢
Special carbon ..... 32.5¢
Extra carbon ..... 27¢
Regular carbon ..... 23¢

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

CLAD STEEL

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa. *L4*	*29.5	
Washington, Pa. *J2*	*29.5	
Claymont, Del. *C4*	*28.00	
Conshohocken, Pa. *A2*		*27.50
New Castle, Ind *I2*	*26.50	*25.50
Nickel-carbon		
10 pct Coatesville, Pa. *L4*	32.5	
Inconel-carbon		
10 pct Coatesville, Pa. *L4*	40.5	
Monel-carbon		
10 pct Coatesville, Pa. *L4*	33.5	
No. 302 Stainless-copper stainless, Carnegie, Pa. *A6*		77.00
Aluminized steel sheets hot dip, Butler, Pa. *A7*		7.75

*Includes annealing and pickling, or sandblasting.

ELECTRODES

Cents per lb, f.o.b., plant threaded electrodes with nipples, unboxed

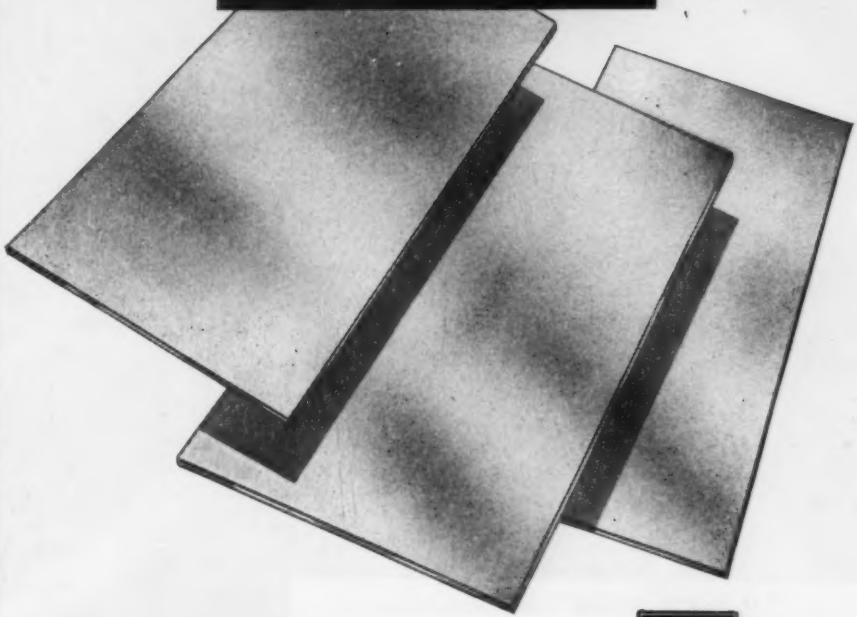
Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
17, 18, 20	60, 72	17.85
8 to 16	48, 60, 72	17.85
7	48, 60	19.57
6	48, 60	20.95
4, 5	40	21.50
3	40	22.61
2½	24, 30	23.15
2	24, 30	25.36
	CARBON	
40	100, 110	8.03
35	65, 110	8.03
30	65, 84, 110	8.03
24	72 to 104	8.03
20	84, 90	8.03
17	60, 72	8.03
14	60, 72	8.57
10, 12	60	8.84
8	60	9.10

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; Effective CaF_2 content:
70% or more $43.00
60% or less 40.00

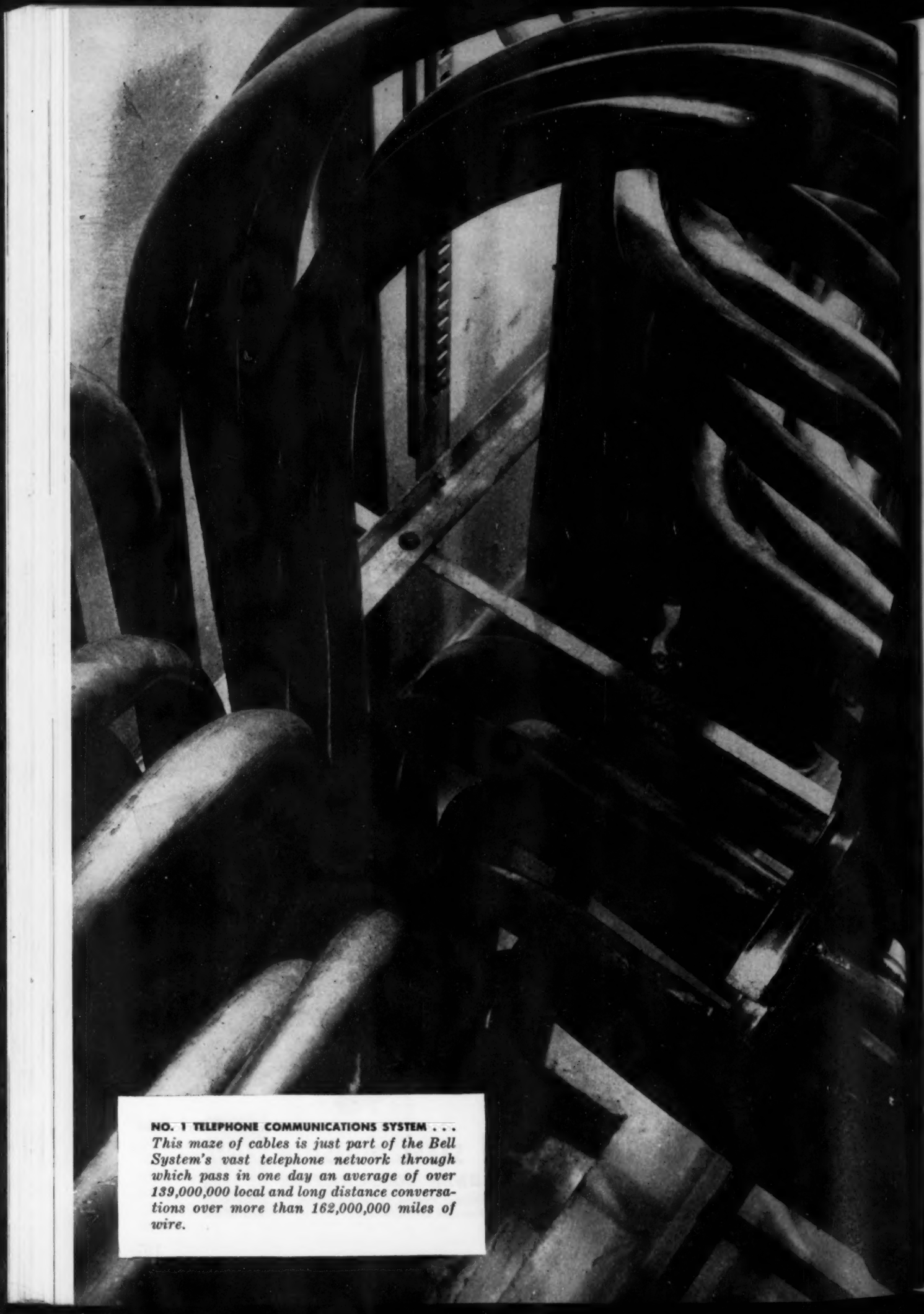
Ingersoll
specializes in . . .

Heat-Resisting
STEELS



Ingersoll STEEL DIVISION
BORG-WARNER CORPORATION
310 South Michigan Avenue, Chicago 4, Illinois
Plant: New Castle, Indiana

ENGINEERING B-W PRODUCTION



NO. 1 TELEPHONE COMMUNICATIONS SYSTEM . . .
This maze of cables is just part of the Bell System's vast telephone network through which pass in one day an average of over 139,000,000 local and long distance conversations over more than 162,000,000 miles of wire.

there's only one No. 1 in metalworking

The IRON AGE, year after year, carries more advertising messages than any other metalworking magazine.

Unquestionable proof of a medium's virility, its dominance and its prestige can be ascertained from the number of advertising pages it carries. Hundreds of advertising buyers, after studying all publications carefully—after looking at overwhelming evidence of reader preference studies and circulation dominance . . . have placed more pages of advertising, year after year, in The IRON AGE than in any other metalworking medium. Make your advertising investment worthwhile . . . make The IRON AGE your No. 1 metalworking medium.

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No. 1 . . . IN WEEKLY CIRCULATION
No. 1 . . . IN READERSHIP SURVEYS
No. 1 . . . IN MARKET COVERAGE
No. 1 . . . IN ADVERTISING VOLUME

No. 1 in Metalworking . . .
America s No. 1 Market

The IronAge

A CHILTON PUBLICATION, 100 E. 42nd ST., N. Y. 17, N. Y.

ABC CCA NBP

Fittings are the Stitches.. that hold your *Piping Fabric* together

Fittings are important — from many standpoints. Cost, reliability, ease of assembly and life, to name a few. They're the stitches that hold your piping fabric together — that make it an efficient operating entity.

We sell fittings — not one type, but many. We do so because we know from experience that no one type is best suited for every job.

Immediately available from stock are seamless carbon steel welding fittings, up to 24 inch for use with standard, extra strong and double extra strong pipe. Also forged steel flanges.

For stainless pipe, we stock 18-8 screwed fittings, types 304 and 316, stainless welding fittings and flanges and light weight Speedline fittings for Schedule 5 stainless pipe.

Consult us about fittings. We want you to have the type best suited to your needs.

Our other products include Stainless and Carbon Steel Pipe, Boiler and Pressure Tubes, Seamless Steel Mechanical Tubing. All types of Pipe and Tube Fabrication.

STEEL TUBULAR PRODUCTS
A B MURRAY CO., INC.
SINCE 1845
ELIZABETH, N. J. McKEESPORT, PA.

—Miscellaneous Prices—

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched—Sq.

	Pct Off List Less Keg. Reg.	K. Reg.	Less Keg. Hvy.	K. Hvy.
½ in. & smaller.	15	28½	15	28½
9/16 in. & ⅝ in.	12	25	6½	21
¾ in. to 1½ in. inclusive	9	23	1	16½
1⅝ in. & larger.	7½	22	1	16½

Nuts, Hot Pressed—Hexagon

½ in. & smaller.	26	37	22	34
9/16 in. & ⅝ in.	16½	29½	6½	21
¾ in. to 1½ in. inclusive	12	25	2	17½
1⅝ in. & larger.	8⅛	23	2	17½

Nuts, Cold Punched—Hexagon

½ in. & smaller.	26	37	22	34
9/16 in. & ⅝ in.	23	35	17½	30½
¾ in. to 1½ in. inclusive	19½	31½	12	25
1⅝ in. & larger.	12	25	6½	21

Nuts, Semi-Finished—Hexagon

	Reg.		Hvy.	
½ in. & smaller.	35	45	28½	29½
9/16 in. & ⅝ in.	29½	40½	22	34
¾ in. to 1½ in. inclusive	24	36	15	28½
1⅝ in. & larger.	13	26	8½	23
	Light			
7/16 in. & smaller	35	45		
½ in. thus ⅝ in.	28½	39½		
¾ in. to 1½ in. inclusive	26	37		

Stove Bolts — *Pct Off List*

Packaged, steel, plain finished. 48—10
Packaged, plate finish ..... 31—10
Bulk, plain finish** 62*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets — *Base per 100 lb*

½ in. & larger $7.85

Cap and Set Screws

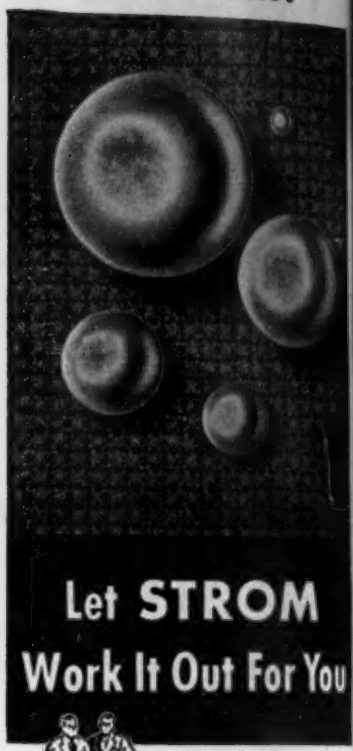
(In bulk) — *Pct Off List*

Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright	54
¾ in. thru 1 in. up to & including 6 in.	48
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat	46
¾ in. thru 1 in. up to & including 6 in.	41
Milled studs	35
Flat head cap screws, listed sizes....	16
Fillister head cap, listed sizes	34
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	53

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	15	28½
9/16 in. & ⅝ in. x 6 in. & shorter	18½	30½
¾ in. & larger x 6 in. & shorter	17½	29½
All diam. longer than 6 in..	14	27½
Lag, all diam. x 6 in. & shorter	23	35
Lag, all diam. longer than 6 in.	21	33
Plow bolts	34	.....

a metal ball PROBLEM?



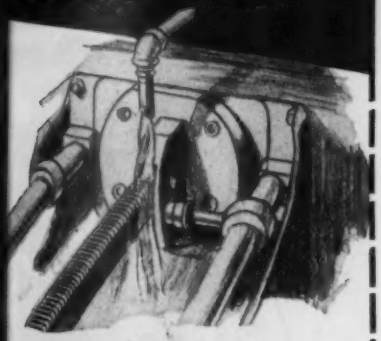
Let STROM Work It Out For You

Whether it is a precision ball bearing or one of the other many ball applications in industry, your problem will not be entirely new. Strom has been in on many ball problems and knows the importance of the right ball for the job.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

Strom STEEL BALL CO.
1850 So. 54th Ave., Cicero 50, Ill.
Largest Independent and Exclusive Metal Ball Manufacturer

TOUGH or EASY machining . . .



MORE THAN A "COOLANT" IS NEEDED

LITERALLY thousands of plants will testify that Stuart cutting fluids have been their only answer on *really tough* machining jobs. The research and experience that makes Stuart a leader on the tough jobs pays real dividends on the easy jobs. Stuart knows that *more than a "coolant" is needed* — that cooling, lubricity and anti-weld characteristics must be combined in a cutting fluid if optimum finish, tool life and production are to be secured.

This doesn't mean that you must have a different cutting fluid for every job, but it does mean you need a cutting fluid that is *right* for the job.

Send for NEW BOOKLET "MORE THAN A COOLANT IS NEEDED" and ask a Stuart representative to show you how the planned application of Stuart cutting fluids will give you more output, longer tool life, better finish and lower cost.

Offices in Principal Industrial Centers

TIME-TESTED Cutting Fluids and Lubricants

D.A. Stuart Oil Co. LIMITED

EST 1865

2737 S. Troy St., Chicago 23, Ill.

—Miscellaneous Prices—

REFRACTORIES

Fire Clay Brick

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5)	$94.60
No. 1 Ohio	88.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	88.00
No. 2 Ohio	79.20
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$94.60
Childs, Pa.	99.00
Hays, Pa.	100.10
Chicago District	104.50
Western Utah and Calif.	111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago	111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	16.50
Silica cement, net ton, bulk, Hays, Pa.	18.70
Silica cement, net ton, bulk, Ensley, Ala.	17.60
Silica cement, net ton, bulk, Chicago District	17.60
Silica cement, net ton, bulk, Utah and Calif.	24.70

Chrome Brick *Per Net Ton*

Standard chemically bonded balt., Chester	$82.00

Magnesite Brick

Standard, Baltimore	$104.00
Chemically bonded, Baltimore	93.00

Grain Magnesite *St. ⅜-in. grains*

Domestic, f.o.b. Baltimore in bulk fines removed	$62.70
Domestic, f.o.b. Chewalah, Wash., in bulk	36.30
in sacks	41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢	$13.75

LAKE SUPERIOR ORES

(51.50% *Fe; natural content, delivered lower lake ports*) *Per gross ton*

Old range, bessemer	$8.70
Old range, nonbessemer	8.55
Mesabi, bessemer	8.45
Mesabi, nonbessemer	8.30
High phosphorus	8.30

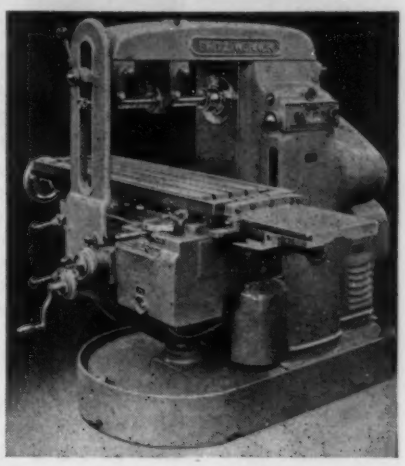
After adjustments for analyses, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

METAL POWDERS

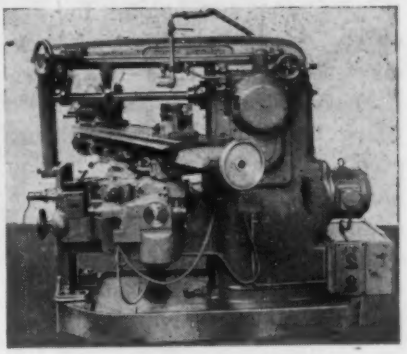
Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.4¢ to 9.0¢
Canadian sponge iron, del'd, In East	10.00¢
Domestic sponge iron, 98+% Fe, carload lots	15.5¢ to 17.0¢
Electrolytic iron, annealed, 99.5+% Fe	42.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	53.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe.	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe.	83.0¢ to $1.48
Aluminum	31.5¢
Brass, 10 ton lots	30.00¢ to 33.25¢
Copper, electrolytic	10.75¢ plus metal value
Copper, reduced	10.00¢ plus metal value
Cadmium, 100-199 lb.	95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity, del'd	$3.50
Lead	7.5¢ to 12.0¢ plus metal value
Manganese	57.0¢
Molybdenum, 99%	$2.75
Nickel, unannealed	88.0¢
Nickel, annealed	95.0¢
Nickel, spherical, unannealed	92.0¢
Silicon	38.5¢
Solder powder	7.0¢ to 9.0¢ plus met. value
Stainless steel, 302	83.00¢
Stainless steel, 316	$1.10
Tin	14.00¢ plus metal value
Tungstein, 99% (65 mesh)	$6.00
Zinc, 10 ton lots	23.0¢ to 30.5¢

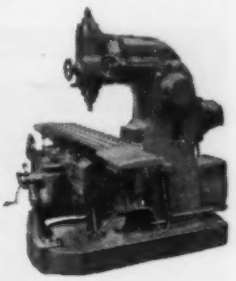
now available



for early delivery

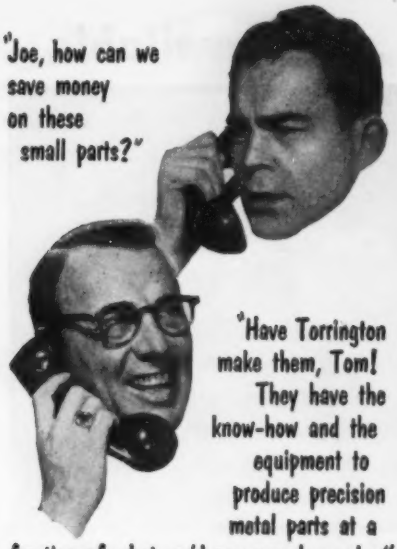


WERNER
UNIVERSAL, VERTICAL & PLAIN
MILLING MACHINES



Manufactured by one of the largest machine tool manufacturers in Europe, these millers offer every feature you could desire for economical, perfect precision operation — plus *reasonable* delivery. In sizes 1, 2, 3, 4 and 5, universal, vertical and plain — also manufacturing types. Write today for complete illustrated brochure No. 8.

MARAC MACHINERY CORPORATION
1819 BROADWAY • NEW YORK 23, N. Y.
Circle 7-2048


"Joe, how can we save money on these small parts?"
"Have Torrington make them, Tom! They have the know-how and the equipment to produce precision metal parts at a fraction of what we'd pay anywhere else."

When it comes to holding the line on costs—and holding strict tolerances at the same time—it takes experience and facilities. For over 86 years, Torrington has been making precision metal parts. Production facilities include batteries of automatic and semi-automatic machines—many of them Torrington-designed—and one of the finest heat-treating departments in the world. In addition, we have at our disposal the combined experience and facilities of all 11 plants of The Torrington Company.

If you need precision metal parts, ask us for a quotation. Just send us a sample or blueprint and tell us how many you need.

THE TORRINGTON COMPANY
Specialty Department
555 Field Street • Torrington, Conn.
Makers of
TORRINGTON NEEDLE BEARINGS

—Ferroalloy Prices—

Ferrochrome
Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads delivered. (65-72% Cr, 2% max. Si.)

0.06% C	30.50	0.20% C	29.50
0.10% C	30.00	0.50% C	29.25
0.15% C	29.75	1.00% C	29.00
2.00% C			28.75
65-69% Cr, 4-9% C			22.00
62-66% Cr, 4-6% C, 6-9% Si			22.60

S. M. Ferrochrome
Contract price, cents per pound, chromium contained, lump size, delivered.
High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

High-Nitrogen Ferrochrome
Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

Chromium Metal
Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C.	$1.14
0.50% max. C.	1.10
9 to 11% C.	1.08

Low Carbon Ferrochrome Silicon
(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 21.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.
Bulk 1-in. x down, 21.90¢ per lb contained Cr plus 12.60¢ per lb contained Si.

Calcium-Silicon
Contract price per lb of alloy, dump delivered.
30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon
Contract prices, cents per lb of alloy lump, delivered.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

CM5Z
Contract price, cents per lb of alloy, delivered.
Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.
Alloy 5: 50.56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	20.75
Less ton lots	22.00

5MZ
Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy
Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50
Less ton lots	17.75

Graphidox No. 4
Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.00
Ton lots to carload packed	19.00
Less ton lots	20.50

Ferromanganese
78-82% Mn, maximum contract base price, gross ton, lump size.

F.o.b. Niagara Falls, Alloy, W. Va., Ashtabula, O.	$185
F.o.b. Johnstown, Pa.	$187
F.o.b. Sheridan, Pa.	$185
F.o.b. Etna, Clairton, Pa.	$188

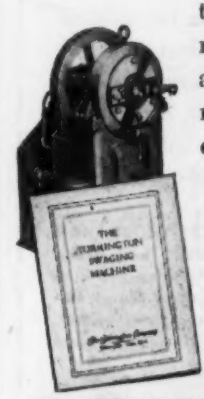
$2.00 for each 1% above 82% Mn, penalty, $2.15 for each 1% below 78%.
Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.95
Ton lots	12.55

the smith had the right idea

When it comes to forming metals, there's no substitute for the hammer. No other method gives metal equal toughness and resiliency.

The Torrington Swager operates on the same principle—delivering 4000 hammer blows a minute. It reduces, tapers and points rod, wire and tubing accurately and economically . . . using every ounce of stock.



Our booklet, "The Torrington Swaging Machine," gives full details on swaging and our complete line of machines. A free copy is yours for the asking.

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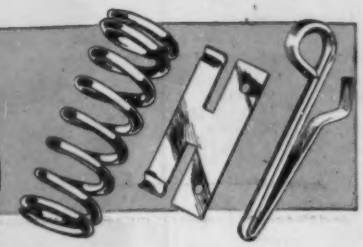
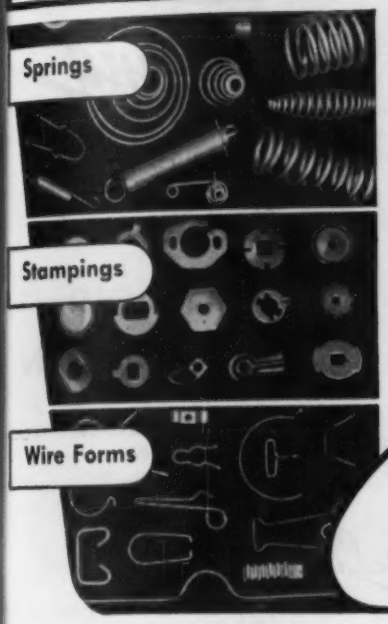
Swager Department
555 Field Street • Torrington, Conn.
Makers of
TORRINGTON NEEDLE BEARINGS

Any
• QUANTITY
• MATERIAL
• or SHAPE

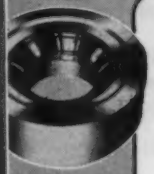


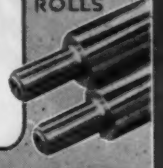


Parts like these are made to your specifications. When desired, spot welding, tapping and small assemblies can be provided. All tools and production equipment made in our plant. Send us your drawings or samples. Consult us on applications.

M. D. Hubbard
Spring Company
362 Central Avenue
Pontiac 12, Mich.

Talide
(TUNGSTEN CARBIDE)
MEETS
EVERY REQUIREMENT





For the past twenty-five years actual operating records have proven the advantages of Talide tools, dies, blades, bushings, rolls and other tungsten carbide products.

On most cutting, drawing, rolling and wear-resistant applications, you can triple your production and cut costs in half. Extra long runs make Talide Metal less expensive than steel.

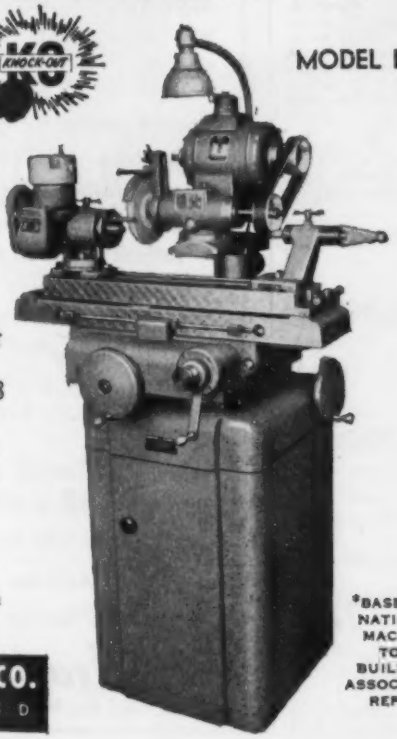
Send us parts or prints and we will show you how this hardest man-made metal can help you secure more production from your present equipment. Write for Catalog 50-G or ask for a Talide sales engineer to call.

TALIDE
YOUNGSTOWN, OHIO

METAL CARBIDES CORPORATION
YOUNGSTOWN 7, OHIO
SINTERED CARBIDES—HOT PRESSED CARBIDES

There's a reason 71%*
of all popularly-priced Tool and Cutter Grinders sold in 1951 were "Knock-Outs"

MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

Distributed Only Through Franchise Dealers

K. O. LEE CO.
ABERDEEN, S. D.

*BASED ON NATIONAL MACHINE TOOL BUILDER'S ASSOCIATION REPORT

MUNDT

PERFORATED METALS

The few perforations illustrated are indicative of the wide variety of our line—we can *perforate almost any size perforation in any kind of metal or material required.* Send us your specifications.

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—Ferroalloy Prices—
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Contract prices gross ton; lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$74.00	$75.00
Pgh. or Chicago	75.00	76.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	34.75
Ton lots	36.25

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F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.7% max. C, 0.06% P, 90% Mn	26.25	28.10	29.30
0.07% max. C	25.75	27.60	28.80
0.15% max. C	25.25	27.10	28.30
0.30% max. C	24.75	26.60	27.80
0.50% max. C	24.25	26.10	27.30
0.75% max. C 7.00% max. Si	21.25	23.10	24.30

Alsifer, 20%Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carloads	9.90
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Calcium molybdate, 46.3-46.6% f.o.b. Langeloth, Pa., per pound contained Mo. $1.15

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Carload bulk	9.90
Ton lots	11.55
Briquet, contract basis carlots, bulk delivered, per lb of briquet	11.15
Ton lots	12.75

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Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $92.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $90.000. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

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96% Si, 2% Fe	21.70
97% Si, 1% Fe	22.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.

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Ton lots	8.55

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50% Si	12.40	85% Si	15.55
90.95% Si			17.50

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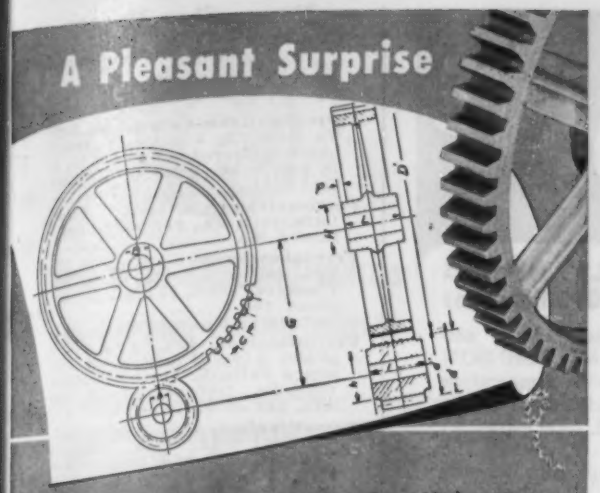

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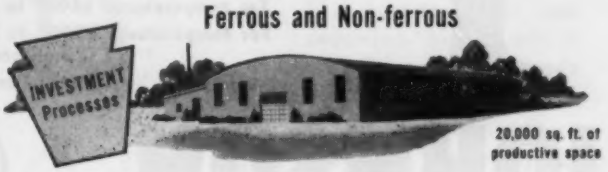

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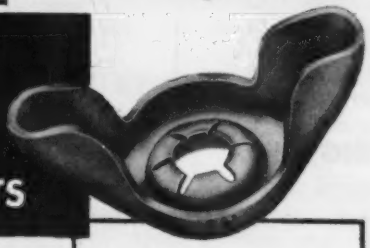

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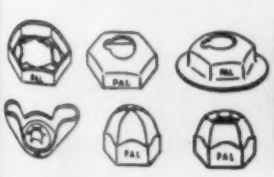

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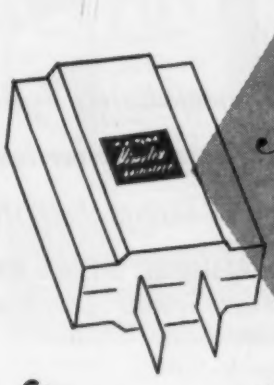

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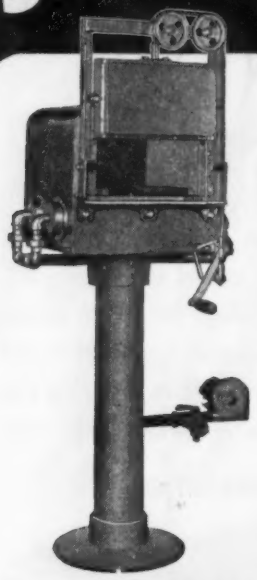

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Ton lots, per pound ..... 45¢
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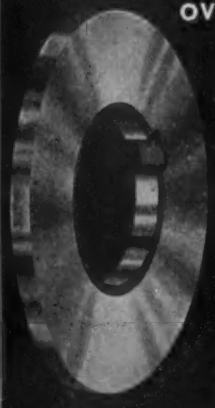

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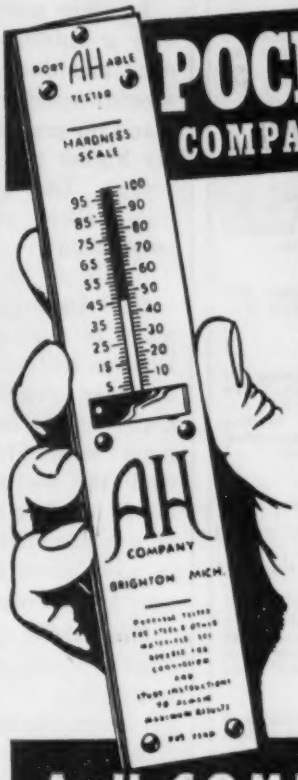

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NEWS OF USED, REBUILT AND SURPLUS MACHINERY

Office of Price Stabilization is still playing the artful dodger with the used machinery industry when talk swings to higher prices to match increases in new machine tools. The agency appears to be talking tougher on holding the price line. A deeper pessimism on the extent of the planned amendment to CPR 80 is taking hold.

In other words, OPS may grant only a piddling token increase to used machinery. That's a danger strengthened by OPS' obstinate stand on granting the steel industry higher prices to offset higher wages. The stay-tough attitude may reflect on the tool order amendment.

OPS Damage—OPS people will meet this week with Machinery Dealers National Assn.'s industry advisory committee to get the trade's slant on how much of an increase should be granted. How well OPS will heed industry opinion is another matter. The justice of not permitting price increases in used tools to keep pace with new tools escapes the fair-minded.

Meanwhile, OPS lethargy in either putting up or shutting up is hampering the trade's efforts to get desirable late type equipment. Manufacturers possessing needed machine tools won't let go unless they get top dollar. Another factor that OPS is not considering is that used business has slowed up all over the country. The trade is operating at a slower tempo while their prices are kept at low and obsolete levels.

Foreign Tools — Worth of the great number of inquiries submitted at foreign machine tool exhibits held at American Society of Tool Engineers convention has not yet been evaluated. The wheat must still be sifted from the chaff but one dealer has been pleased at the amount of interest shown. He is displeased, however, that many of the smaller plants, a traditional market, do not have enough defense contracts to show more than interest.

Used machinery dealers on the East Coast have because of their convenient location to ports partaken most heavily in the tool import business. Some have managed to somewhat balance losses in used trade by selling the imported. But it should be remembered that low prices (abetted by OPS) which do not bring out good late type stuff push buyers to purchases of foreign tools.

Radial Drills — Advantages of foreign machine tools have been shorter delivery to both defense and non-defense producers at lower prices. Unfamiliarity with foreign tools and fear that parts and service would not be available have held back sales in the past. The shortage and improvements in volume and quality of foreign tools have offset buyer hesitancy. Imported radial drills are scarcer.

Pattern's Same—The New York market is following the pattern of all others. Number of inquiries has slipped. Offerings of good late type models have suffered the same fate. One dealer told THE IRON AGE that he recently received a list of available tools from a large manufacturer. They were modern tools which could be sold immediately. But he was unable to enter negotiations because the owner had his own idea of how much they were worth—exceeding that of OPS.

Old type machine tools remain sluggish in New York and the hoped-for rush has not materialized. Reason is that defense work has not been enough of an incentive. It may never be, it's now realized. Demand centers around late model turret lathes, mills, and radial drills.

Convention! — National Industrial Service Assn. is in the throes of last minute preparation for its 19th annual convention to be held from Apr. 20 to 24 at Chicago's Conrad Hilton Hotel.